RRC Group D Previous Year Paper 28 (Held On: 26 Sept 2018 Shift 2)

RRB Group D • 2018 • 100 questions • 90 minutes • Answer key and solutions

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CBT

Q1. The sum of 5/11 and 11/5 is:

(a) 16/55
(b) 110/55
(c) 146/55
(d) 16/16

Q2. Who is the author of the book ‘Half Girl Friend’, released recently?

(a) Shashi Tharoor
(b) Vinod Chopra
(c) Chetan Bhagat
(d) Rajdeep Sardesai

Q3. Tartaric acid is a constituent of _____.

(a) Baking powder
(b) Baking soda
(c) Washing soda
(d) Vinegar

Q4. 63% of a number is 315. What is the number?

(a) 500
(b) 420
(c) 475
(d) 450

Q5. Find the next term in this series.

2, 18, 162, _____.

(a) 1458
(b) 1584
(c) 2400
(d) 1400

Q6. Eka-silicon is known as _____.

(a) Germanium
(b) Silicon
(c) Gallium
(d) Aluminium

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Q7. Which of the following teams won the 2016 Premier Badminton League?

(a) Delhi Acers
(b) Chennai Smashers
(c) Mumbai Rockets
(d) Hyderabad Hunters

Q8. The volume of a right circular cone, whose radius of the base is the same as five-ninths of its altitude and the volume of a sphere are equal. The ratio of the radii of the cone to the sphere is:

(a) cbrt4:cbrt3
(b) 1 : 1
(c) cbrt60 :3
(d) cbrt3:cbrt2

Q9. Who among the following won a gold medal at the World Weightlifting Championship 2017?

(a) Seguru Ana
(b) Mirabai Chanu
(c) Sukcharoen Thunya
(d) Karanam Malleshwari

Q10. Which does NOT belong to this group?

A. Rack
B. Window
C. Door
D. Shutter

(a) D
(b) A
(c) B
(d) C

Q11. The absolute refraction index of diamond is _____.

(a) 2.23
(b) 2.32
(c) 2.42
(d) 2.24

Q12. The Harshacharitra by _____ gives us accurate information about Harsha and his administration.

(a) Fa Hien
(b) Tulsidas
(c) Kalhana
(d) Banabhattta

Q13. Identify the wrong term from the following series.

1, 8, 27, 125, 342, 1331

(a) 1331
(b) 27
(c) 342
(d) 125

Q14. As of August 2018, who is the present union minister of Agriculture and Farmers Welfare?

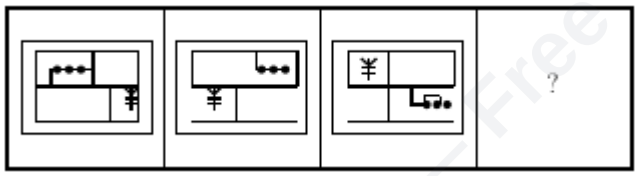
(a) Arun Jaitely
(b) Radha Mohan Singh
(c) J.P. Nadda
(d) Piyush Goyal

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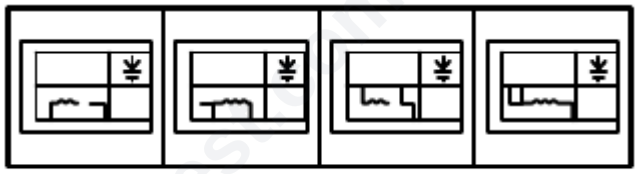
Q15. India tested its first nuclear device in _____.

(a) Sriharikota
(b) Kalpakaam
(c) Pokhran
(d) Tarapur

Q16. Which figure follows next?



Option Figures



(a) A
(b) C
(c) B
(d) D

Q17. Find the value of √4.2436

(a) 2.04
(b) 2.14
(c) 2.06
(d) 2.16

Q18. A solution contains 60 g of common salt in 340 g water. Calculate the concentration of salt in terms of mass by mass percentage of the solution.

(a) 60%
(b) 25%
(c) 15%
(d) 10%

Q19. _____ double bond(s) is/are present in one molecule of Benzene.

(a) 3
(b) 1
(c) 2
(d) 4

Q20. Who established the Sun TV Network?

(a) Kalanithi Maran
(b) Rakhesh Jhunjhunwala
(c) Vikas Oberoi
(d) Ranjan Pai

Q21. You are given a question and two statements. Identify which of the statements is/are necessary/sufficient to answer the question.

What will be the age of S, 3 years from now?

Statements:

1. M is 25 years old today

2. S is younger to M by 10 years

(a) Statement 2 alone is sufficient
(b) Statement 1 alone is sufficient
(c) statement 1 and 2 together are not sufficient
(d) statements 1 and 2 together are necessary

Q22. Which of the following numbers will have an irrational square root?

(a) 13225
(b) 18025
(c) 15625
(d) 21025

Q23. You are given a question and three statements. Identify which of the statements is/are necessary/sufficient to answer the question.

K, F, M and T are standing in a queue. Based on the following information, can we tell who is standing in the second place if we arrange shortest to tallest?

Statements:

1. F is the tallest.
2. K is taller than T.
3. T is the shortest.

(a) statements 1 and 2 together are sufficient.
(b) statement 1 and 3 are sufficient to solve.
(c) The statements are insufficient.
(d) Statements 1, 2, 3 alone are enough to solve.

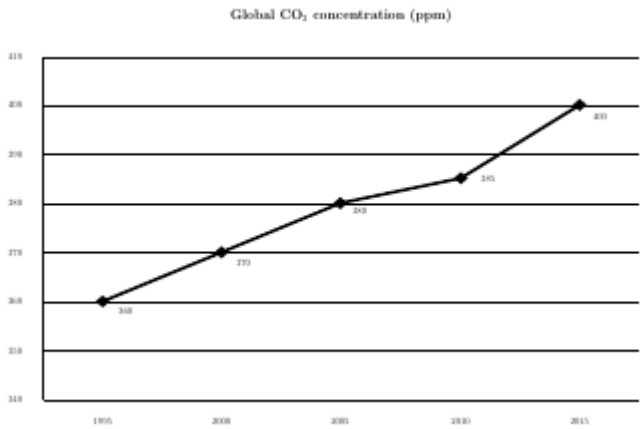
Q24. In a bag the ratio of red balls to green balls is 15 : 26. If 12 more green balls are added to the bag the ratio of red balls to green balls will become 1 : 2. How many red balls are there in the bag?

(a) 30
(b) 45
(c) 15
(d) 60

Q25. Mendel obtained F2 progeny from F1 generation plants by the method of _____.

(a) Cross-pollination
(b) Vegetative propagation
(c) Asexual reproduction
(d) Self-pollination

Q26. Based on the given graph, what is the percentage change in CO2concentration from year 1995 to 2015?



(a) 11.00%
(b) 11.31%
(c) 11.26%

(d) 11.11%

Q27. Zinc can displace copper from copper sulphate solution because zinc is _____.

(a) more reactive than copper
(b) less reactive than copper
(c) more oxidised than copper
(d) less oxidised than copper

Q28. Which Indian woman cricketer crossed the 200 ODI wickets in 2018?

(a) Charlotte Edwards
(b) Dane van Niekerk
(c) Meg Lanning
(d) Jhulan Goswami

Q29. Name the supersonic missile that was successfully test-fired by the Indian Navy in 2017?

(a) Agni
(b) Vajra
(c) BrahMos
(d) GSAT-17

Q30. In _____, local thunderstorms are called mango shower which helps in ripening mango crop.

(a) Odisha
(b) Gujrat
(c) Uttar Pradesh
(d) Kerala

Q31. If $2x^2 + ax + 2b$, when divided by $x - 1$, leaves a remainder of 16 and $x^2 + bx + 2a$, when divided by $x + 1$, leaves a remainder of -1 then $a + b$ equals:

(a) 14
(b) -8
(c) -14
(d) 8

Q32. $104 \div [68 - \{29 - (45 - 56 \div 7 \times 4)\}] = ?$

(a) 4
(b) 2
(c) 8
(d) 13

Q33. In the modern periodic table, elements having atomic numbers 19 to 36 are placed in the period _____.

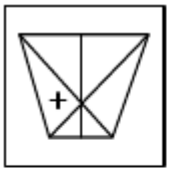
(a) 4
(b) 6
(c) 5
(d) 3

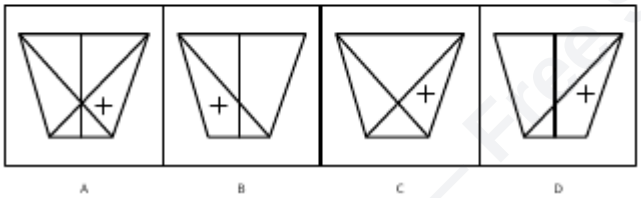
Q34. If $a + 1/a = - 6$, find the value of $a^3 + 1/(a^3)$

(a) 216
(b) -198
(c) -216
(d) 198

Q35. Which of the options bears the closest resemblance to the following figure?

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(a) D
(b) B
(c) A
(d) C

Q36. A and B can complete a task in 50 days, B and C can complete it in 37.5 days while C and A can do the same task together in 30 days, How many days will A, B and C each take complete the task individually?

(a) 40, 60 and 120
(b) 60, 120 and 40
(c) 75, 150 and 50
(d) 50, 150 and 75

Q37. A shop consumed 250 units of energy in a month. How much energy was consumed in joules?

(a) 9 × 10^(-8) J
(b) 9 × 10^(-7) J
(c) 9 × 10^8J
(d) 9 × 10^7 J

Q38. The two roots of a quadratic equation are given as x = 4/3 and x = (- 3)/7. The equation can be written as:

(a) (7x – 3) (3x – 4) = 0
(b) (7x + 3) (3x – 4) = 0
(c) (7x + 3) (3x + 4) = 0
(d) (7x – 3) (3x + 4) = 0

Q39. Usha Uthup of West Bengal won the Padma Shri for which field?

(a) Literature
(b) Social Work
(c) Arts
(d) Theatre

Q40. Pyarimohan Mohapatra is a political leader belonging to which Indian state?

(a) Assam
(b) West Bengal
(c) Bihar
(d) Odisha

Q41. Bone cells are embedded in a hard matrix that is composed of _____.

(a) Ca and Na
(b) P and Na
(c) Ca and F
(d) Ca and P

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Q42. If '<' is treated as '+' and '×' is treated as '÷', then what will be the value of
([(25 < 15)] × 4) < 1 ?

(a) 11
(b) 5
(c) 20
(d) 13

Q43. Last year, Mayank's capital investment in a small business venture was Rs. 20,000. This year, to cater to new customer base, he is planning to increase the capital funding to 30% of what he had invested last year. How much money is he planning to invest this year?

(a) 23,000
(b) 22,500
(c) 60,000
(d) 26,000

Q44. 2500 Watts = _____ kW

(a) 250
(b) 0.25
(c) 25
(d) 2.5

Q45. _____ is commonly used in electrical heating devices.

(a) Copper
(b) Nichrome
(c) Iron
(d) Aluminium

Q46. A boy is observing a hot air balloon flying at 692 m above ground. The angle of elevation of balloon from the eyes of the boy was 60°. After sometime, the balloon moves away horizontally from the boy and the angle reduces to 30°. What is the approximate distance travelled by the balloon? Take √3 = 1.73

(a) 400 m
(b) 800 m
(c) 600 m
(d) 200 m

Q47. The square root of 4356 is:

(a) 84
(b) 66
(c) 64
(d) 76

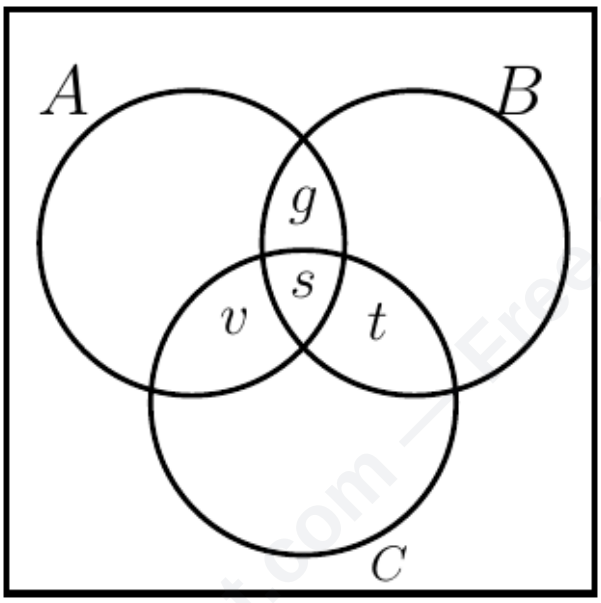
Q48. Based on the given Venn diagram, answer the following question.

A- People who are efficient

B- People who are honest

C- People who are hard-working

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Which segment represents people who are only hardworking but not honest or efficient?

(a) c – (v + s + t)
(b) c – (v + s)
(c) c
(d) c – (v + t)

Q49. Select the term that relates to the third term in the same way that the second term relates to the first term.

Trees : Plants :: Desert : ?

(a) Mirage
(b) Palm
(c) Water
(d) Land

Q50. Which of the following is one of the features of Insolvency and Bankruptcy Code (Amendment) Ordinance, 2018?

(a) Relief to home buyers by recognising their status as financial creditors
(b) Full waiver of interest
(c) Payment of interest subsidy
(d) Free loan to creditors

Q51. In a certain code, if TIME is written as 209135, then how will WATCH be written as?

(a) 2312038
(b) 2412039
(c) 2412038
(d) 2312039

Q52. What is the maximum number of electrons that can be accommodated in k shell?

(a) 18
(b) 32
(c) 2
(d) 8

Q53. India's first Videsh Bhavan will be established in which of the following states?

(a) Jharkhand
(b) Bihar
(c) Maharashtra
(d) Gujarat

Q54. A flatworm named _____ has very simple 'eyes' that are really just eye-spots which detect light.

(a) Ascaris
(b) Tapeworm
(c) Liverfluke
(d) Planaria

Q55. Find the next term in this series

343, 383, 443, 483, _____.

(a) 543
(b) 548
(c) 600
(d) 643

Q56. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statement:

After watching a movie, Leela said, "I will suggest all my friends to watch this movie."

Conclusions:

I. Leela enjoyed watching the movie

II. She wants her friends to watch too

(a) Conclusion II alone follows
(b) Conclusion I alone follows
(c) Both the conclusions follow
(d) Neither I nor II follows

Q57. In a code language, GATE is written as 71205. What is the code for DOOR?

(a) 4151519
(b) 4151518
(c) 5151518
(d) 4151520

Q58. Given is a question followed by two arguments. Decide which of the arguments is/are strong with respect to the question.

Are smart phones addictive?

Arguments:

I. Yes, once you are used to smart phones, you tend to spend more time on mobiles ignoring personal time.

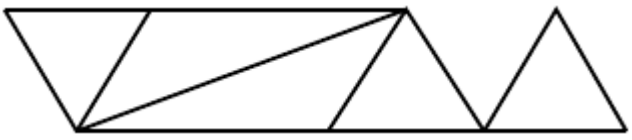
II. No, they offer additional features that are very necessary for modern day lifestyle.

(a) Only argument I is strong.
(b) Neither argument I nor II is strong.
(c) Only argument II is strong.
(d) Both arguments I and II are strong.

Q59. The formula of ethanol is _____.

(a) CH5OH
(b) C2H6OH
(c) C2H5OH
(d) CH3CH2OH2

Q60. How many triangles are there in this figure?



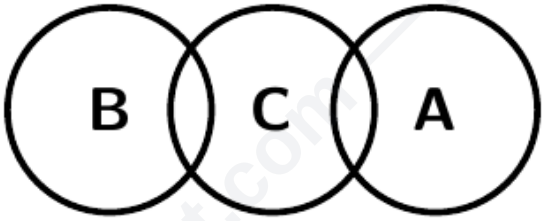
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(a) 5
(b) 6
(c) 9
(d) 7

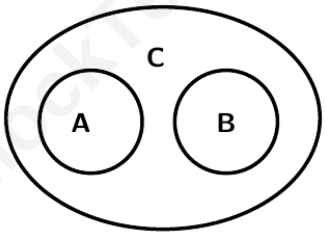
Q61. Which of the following Venn diagrams correctly represents the relationship between the following words?

A. Walking
B. Swimming
C. Exercise

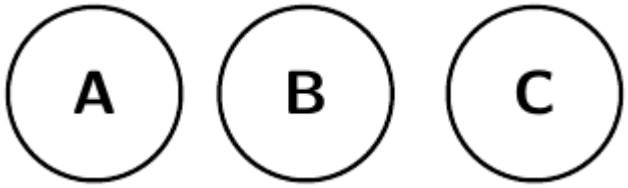
(a)



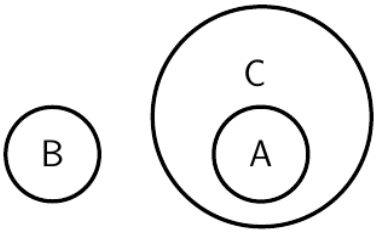
(b)



(c)



(d)



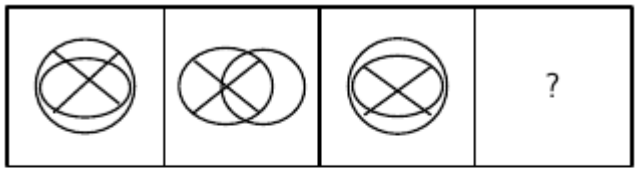
Q62. Two inlet pipes A and B can fill an empty cistern in 22 and 33 hours respectively. They start work together but pipe A had to be closed 5.5 hours before the cistern was full. How many hour in all did it take the two pipes to fill the cistern?

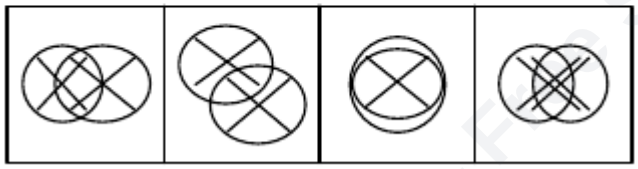
(a) 16
(b) 16.5
(c) 19.25
(d) 16.2

Q63. Select the option figure that will complete the series of question figures.

Option Figures:

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(a) B
(b) A
(c) C
(d) D

Q64. Which of the following is NOT the neighbouring state of West Bengal?

(a) Sikkim
(b) Odisha
(c) Jharkhand
(d) Meghalaya

Q65. The cerebellum is concerned with _____.

(a) Remembering and hunger
(b) Coordination of muscular movement
(c) All involuntary actions
(d) Thinking

Q66. Who won the 2016 Lata Mangeshkar Award For Lifetime Achievement?

(a) Uttam Singh
(b) Preetam Singh
(c) Arijit Singh
(d) Bappi Lahiri

Q67. An object of mass 10 kg is moving with a velocity of 2 ms^(-1). The momentum possessed by the body is _____.

(a) 30 kg.m/s
(b) 5 kg.m/s
(c) 10 kg.m/s
(d) 20 kg.m/s

Q68. Arab merchants shipped Indian goods to _____ countries through the Red Sea and the Mediterranean ports.

(a) Australian
(b) European
(c) African
(d) American

Q69. Which of the following does NOT belong to this group?

A. Clip
B. Pin
C. Band
D. Towel

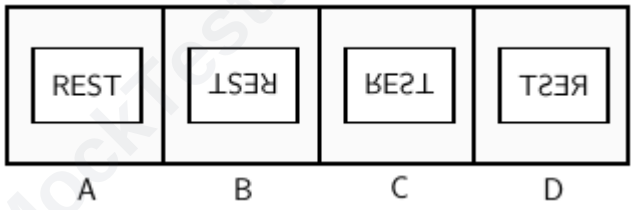
(a) D
(b) B

(c) C
(d) A

Q70. An object travels 25 m in 4 s and then another 15 m in 2 s. What is the average speed of the object?
(a) 6.67 s^(-1)
(b) 6.67 ms¹
(c) 6.67 m
(d) 6.67 ms^(-1)

Q71. Raghav's age after 11 years will be 5 times his age 5 years back. What is Raghav's present age?
(a) 7 years
(b) 4 years
(c) 8 years
(d) 9 years

Q72. Select the horizontal mirror image of REST from the given option figures?
Option figures.

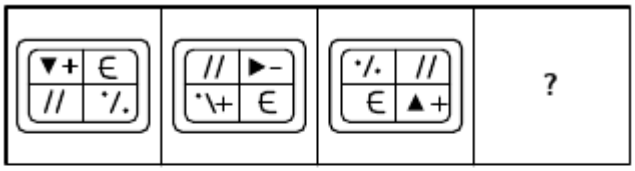


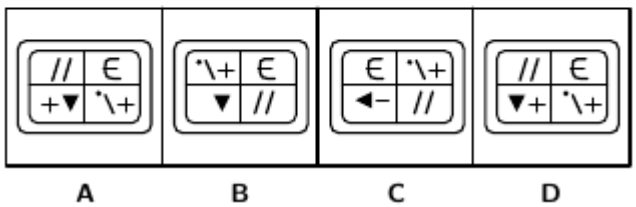
(a) B
(b) A
(c) D
(d) C

Q73. 'When elements are arranged in the order of increasing atomic masses, the atomic mass of the middle element is roughly the average of the atomic masses of the other two elements'. This law is known as _____.
(a) Dobereiner's law of traids
(b) Mendeleev's law
(c) Newlands law of octaves
(d) Newton's law

Q74. If a :b = 3/2 : 7/3 and b :c = 1/5 : 1/7 then find a : b : c.
(a) 14 : 9 : 10
(b) 9 : 14 : 10
(c) 10 : 9 : 14
(d) 4 : 5 : 7

Q75. Which of the option figures follows next in the series on question figures?





(a) A
(b) B
(c) D
(d) C

Q76. The Prime Minister of India cannot participate in voting on a non-confidence motion against her/his government if she/he _____.
(a) Is a member of Rajya sabha
(b) Is in majority
(c) Is a member of Lok Sabha
(d) Forbidden by opposition parties of Lok Sabha

Q77. Who launched “Move Hack”, global mobility hackathon to crowdsource solutions for the future of mobility in India?
(a) Startup India
(b) Startup Village
(c) Standup India
(d) NITI Aayog

Q78. Z and L go for jogging in a park that has a square jogging track. Z jogs at the same pace as L. They jog in opposite directions. If they start jogging East-West direction. Half way through in which direction they will meet again?
(a) North-West
(b) East-West
(c) South-East
(d) South-West

Q79. Which among the following actors won the Best Actor (Male) award at the 18^(th) IIFA Awards held in 2017?
(a) Shahid Kapoor
(b) Arjun Kapoor
(c) Aamir Khan
(d) Salman Khan

Q80. $\{(99 - 1)/7^2\} \times 2 + 8 = ?$
(a) 10
(b) 13
(c) 11
(d) 12

Q81. Which Indian personality was honored with the 2017 Carnegie Medal of Philanthropy?
(a) Anil Ambani
(b) Ness Wadia
(c) Ratan Tata
(d) Azim Premji

Q82. At a given temperature, the speed of sound is maximum in _____.
(a) Steel
(b) Nickel
(c) Iron
(d) Aluminium

Q83. Pointing to a photograph, Neel says he is the son of the only daughter of the father of my sister. Whom is he pointing at?
(a) Nephew
(b) Friend
(c) Cousin
(d) Niece

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Q84. Consider the given statement(s) and decide which of the given assumptions is/are implicit in the statement.

Statement: “We are all victims of our thoughts,” says a title in a newspaper column.

Assumptions:

I. Our actions are based on our thoughts.

II. Newspapers are the best source of information.

(a) Both I and II are implicit
(b) Only assumption II is implicit
(c) Neither I nor II is implicit
(d) Only assumption I is implicit

Q85. The effect of Thrust depends on which of the following?

(a) Area
(b) Volume
(c) Mass
(d) Weight

Q86. Between $5^2$and 6^2 there are _____ non-perfect square numbers.

(a) 11
(b) 6
(c) 12
(d) 10

Q87. A student has to secure 40% marks to pass. He obtains 40 marks and fails by 40 marks. What are the maximum marks obtainable?

(a) 400
(b) 250
(c) 200
(d) 500

Q88. Pipe A can fill an empty cistern in 6.8 hours. Pipe B can fill it up in 10.2 hours. Only Pipe B is turned on for 1.7 hours after which Pipe A is also tuned on. How much time will it take in all to fill up the cistern?

(a) 5 hours 6 minutes
(b) 5 hours 12 minutes
(c) 5 hours 5 minutes
(d) 5 hours 10 minutes

Q89. Vinita and Nikita are sisters. Vinay is the son of Nikita’s father’s sister. How is Vinay related to Vinita?

(a) Father
(b) Brother
(c) Cousin
(d) Uncle

Q90. A 153 m long train crosses a 747 m long bridge in 40.5 seconds. What is the speed of the train?

(a) 80 km/h
(b) 70 km/h
(c) 75 km/h
(d) 85 km/h

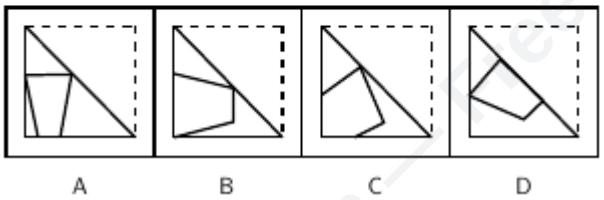
Q91. In a code language, JAIL is written as 9081. What is the code for PRISON?

(a) 578843
(b) 598843
(c) 579843
(d) 578943

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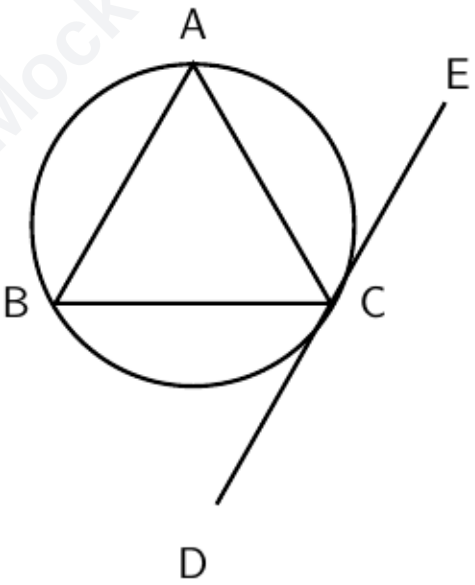
Q92. Which pattern will the given transparent sheet resemble when it is folded at the dotted line?





(a) C
(b) D
(c) B
(d) A

Q93. If angle BCD = 82°, then angle BAC = ?



(a) 85°
(b) 82°
(c) 83°
(d) 77°

Q94. A ball thrown up vertically returns to the ground after 12.5 second. Find the velocity with which it was thrown up? (g = 10 ms^(-2))

(a) 62.5 ms^(-1)
(b) 65 ms^(-1)
(c) 12.5 ms^(-1)
(d) 10 ms^(-1)

Q95. $(0.16 \times 1.65)/(0.075 \times 0.02^2)$ = ?

(a) 7500
(b) 8800
(c) 8400
(d) 8000

Q96. Plant cell wall is made up of _____.

(a) Chitin
(b) Cellulose and pectin
(c) Pectin only
(d) Murein

Q97. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statement:

"Meneka has a beautiful house, "said Ranjan to Lata.

Conclusions:

I. Ranjan is a civil contractor

II. Lata is fond of houses

(a) Conclusion I alone follows
(b) Neither I nor II follows
(c) Both the conclusions follow
(d) Conclusion II alone follows

Q98. The momentum of a body of mass 200g with kinetic energy of 10 J is _____.

(a) 3 kg m/s
(b) 2 kg m/s
(c) 5 kg m/s
(d) 0.33 kg m/s

Q99. n = number of times the wheel of a bus will rotate to cover a distance of 99 km. if the diameter of the wheel is 63 cm, then find the value of n.

(a) 45,000
(b) 35,000
(c) 40,000
(d) 50,000

Q100. Two men X and Y walk from P to Q a distance of 21 km at 3 and 4 km an hour respectively. Y reaches Q returns immediately and meets X at R, the distance from P to R is

(a) 18 km
(b) 17 km
(c) 16 km
(d) 17.5 km

ANSWER KEY

1	c	2	c	3	a	4	a	5	a	6	a	7	a	8	c	9	b	10	b
11	c	12	d	13	c	14	b	15	c	16	b	17	c	18	c	19	a	20	a
21	d	22	b	23	c	24	b	25	d	26	d	27	a	28	d	29	c	30	d
31	d	32	b	33	a	34	b	35	c	36	c	37	c	38	b	39	c	40	d
41	d	42	a	43	d	44	d	45	b	46	b	47	b	48	a	49	d	50	a
51	a	52	c	53	c	54	d	55	a	56	c	57	b	58	d	59	c	60	d
61	b	62	b	63	b	64	d	65	b	66	a	67	d	68	b	69	a	70	d
71	d	72	d	73	a	74	b	75	d	76	a	77	d	78	b	79	a	80	d
81	d	82	d	83	a	84	d	85	a	86	d	87	c	88	a	89	c	90	a
91	a	92	c	93	b	94	a	95	b	96	b	97	b	98	b	99	d	100	a

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SOLUTIONS

Q1. Answer: (c) 146/55

5/11 + 11/5

= (25 + 121)/55

= 146/55

Q2. Answer: (c) Chetan Bhagat

The Correct Answer is Option 3 i.e Chetan Bhagat.

Author	Books
Sashi Tharoor	• The Great Indian Novel - An Era of Darkness - Pax Indica - The Paradoxical Prime Minister
Chetan Bhagat	• Five Point Someone - One Night at the Call Center - The 3 Mistakes Of My Life - 2 States - Revolution 2020 - Half Girlfriend
Vinod Chopra	• Lage Raho Munna Bhai: The Original Screenplay
Rajdeep Sardesai	• 2019: How Modi Won India - Democracy's XI - Newsman: Tracking India in the Modi Era

Q3. Answer: (a) Baking powder

The Correct Answer is Option 1 i.e Baking powder.

• Baking powder:

• Baking powder is a mixture of baking soda and tartaric acid.

• Tartaric acid has been added to baking powder to neutralize the bitterness produced by sodium bicarbonate (NaHCO3).

• Baking soda:

• It is commonly known as sodium bicarbonate.

• Sodium bicarbonate is a white crystalline solid.

• It is used in baking products like cakes, cookies etc.

• Washing Soda:

• It is commonly known as Na2CO3 or sodium carbonate.

• It is used in softening of hard water.

• It is commonly used as a agent for domestic purposes.It is also used in the manufacturing of paper, soap, textiles, paints, etc.

• Vinegar:

• Vinegar is produced from fermentation of alcohol.

• Vinegar is the natural source for acetic acid.

• It is widely used as a flavouring agent in most of the cuisines.

Q4. Answer: (a) 500

Shortcut Trick

Given that 63% of a number is 315.

Using Unitary Method: 1% → 315 ÷ 63 = 5.

Total number (100%) → 5 × 100 = 500.

Therefore The correct answer is 500.

Alternate Method

Given:

Percentage value = 63%

Resulting value = 315

Formula Used:

Number = (Value ÷ Percentage) × 100

Calculations:

Let the number be x.

=> 63% of x = 315

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=> (63 ÷ 100) × x = 315
=> x = (315 × 100) ÷ 63
=> x = 5 × 100
=> x = 500
Therefore The correct answer is 500.
Additional Information
Percentage Change
Percentage change is calculated as (Difference ÷ Original Value) × 100.
Fraction to Percentage
To convert a fraction to a percentage, multiply the fraction by 100 and add the % symbol.
Base Value Concept
In percentage problems, the original number is always considered as the 100% base.

Q5. Answer: (a) 1458

The pattern followed here is:
2 × 9 = 18
18 × 9 = 162
162 × 9 = 1458
Hence, '1458' is the correct answer.

Q6. Answer: (a) Germanium

The Correct Answer is Option 1 i.e Germanium.
• Germanium (Ge):
• Atomic number is 32.
• Germanium is most widely used as a Semiconductor.
• Germanium is used in transistors and in integrated circuits.
• Germanium is also used as an alloying agent.
• Eka-silicon is known as Germanium.
• Gallium (Ga):
• Atomic number is 31.
• It is used in electronic circuits, semiconductors and light-emitting diodes (LEDs).
• Eka aluminium is known as gallium.
• Silicon (Si):
• Atomic number is 14.
• It is widely used as a semiconductor.
• It is the second most abundant element in the crust.
• Aluminium (Al):
• Atomic number is 13.
• It is soft, malleable and ductile.
• It has high thermal and electrical conductivity
• It has excellent corrosion resistance.
• It is the most abundant metal in the Earth's crust.
• It is widely used for foil, kitchen utensils and conductor cables etc.

Q7. Answer: (a) Delhi Acers

The Correct Answer is Option 1 i.e Delhi Acers.
• Delhi Acers team won the 2016 Premier Badminton League (PBL) title against Mumbai Rockets.
• The season was held from 2–17 January 2016.
• This is the second edition of the Premier Badminton League.
• The second edition was renamed from the Indian Badminton League to the Premier Badminton League.
• Chennai Smashers won the 2017 Premier Badminton League (PBL) against Mumbai Rockets.
• Hyderabad Hunters won the 2017-18 edition of PBL against Bangalore blasters.
• Bangalore Raptors won the 2020 edition of PBL against Northeastern Warriors.

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Q8. Answer: (c) cbrt60 :3

Shortcut Trick

Let radius of cone (r_c) = 5 and altitude (h) = 9.

Volume of cone = $(1/3) \times \pi \times 5^2 \times 9 = 75\pi$.

Volume of sphere = $(4/3) \times \pi \times r_s^3 = 75\pi \Rightarrow r_s^3 = 225/4$.

Ratio $r_c^3 : r_s^3 = 5^3 : (225/4) = 125 : 56.25 = 500 : 225 = 20 : 9$.

Ratio $r_c : r_s = \sqrt[3]{20} : \sqrt[3]{9} = \sqrt[3]{(20 \times 3)} : \sqrt[3]{(9 \times 3)} = \sqrt[3]{60} : 3$.

Therefore The correct answer is $\sqrt[3]{60} : 3$.

Alternate Method

Given:

Radius of cone (r_c) = (5/9) × Height of cone (h)

Volume of Cone = Volume of Sphere

Formula Used:

Volume of Cone = $(1/3)\pi r_c^2 h$

Volume of Sphere = $(4/3)\pi r_s^3$

Calculations:

$\Rightarrow$ From given, $h = (9/5)r_c$

$\Rightarrow (1/3)\pi r_c^2 h = (4/3)\pi r_s^3$

$\Rightarrow r_c^2 \times (9/5)r_c = 4r_s^3$

$\Rightarrow (9/5)r_c^3 = 4r_s^3$

$\Rightarrow r_c^3 / r_s^3 = (4 \times 5) / 9 = 20 / 9$

$\Rightarrow r_c / r_s = \sqrt[3]{(20/9)}$

$\Rightarrow$ Multiply numerator and denominator by $\sqrt[3]{3}$ to rationalize

$\Rightarrow r_c / r_s = (\sqrt[3]{20} \times \sqrt[3]{3}) / (\sqrt[3]{9} \times \sqrt[3]{3}) = \sqrt[3]{60} / \sqrt[3]{27}$

$\Rightarrow r_c / r_s = \sqrt[3]{60} / 3$

Therefore The correct answer is $\sqrt[3]{60} : 3$.

Additional Information

Right Circular Cone Properties

Slant height (l) = $\sqrt{(r^2 + h^2)}$. Total Surface Area = $\pi r(l + r)$.

Sphere Properties

Surface Area of a sphere = $4\pi r^2$. Volume = $(4/3)\pi r^3$.

Ratio of Volumes

When comparing volumes of different 3D shapes, ensure all dimensions are in the same units and express heights in terms of radii where possible.

Q9. Answer: (b) Mirabai Chanu

The Correct Answer is Option 2 i.e Mirabai Chanu.

• Mirabai Chanu:

• She is an Indian weight lifter from Manipur.

• She was the only second Indian after Karnam Malleswari to win a gold medal at the World Weightlifting Championships.

• She won the gold medal in women's 48 kg category at the 2017 World Championship being held in Anaheim, USA.

• Thunya Sukcharoen:

• She is an Thai weightlifter.

• Thailand’s Sukcharoen Thunya won the silver medal at the 2017 World Championship being held in Anaheim, USA.

• Segura Ana Iris:

• She is from Colombia.

• Segura Ana Iris bagged the bronze medal at the 2017 World Championship being held in Anaheim, USA.

• Karnam Malleswari:

• She is a retired Indian weightlifter.

• She became the first Indian woman to win a medal at the Olympics in Sydney 2000.

• She also became the first Indian woman to become a weightlifting World Champion in 1994 in Istanbul.

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Q10. Answer: (b) A

All options except 'rack' are things which can be opened and closed.

Term	Explanation
Rack	a framework, typically with rails, bars, hooks, or pegs, for holding or storing things.
Window	an opening in the wall or roof of a building or vehicle, fitted with glass in a frame to admit light or air and allow people to see out.
Door	a hinged, sliding, or revolving barrier at the entrance to a building, room, or vehicle, or in the framework of a cupboard.
Shutter	each of a pair of hinged panels fixed inside or outside a window that can be closed for security or privacy or to keep out the light.

Hence, 'rack' is the correct answer.

Q11. Answer: (c) 2.42

CONCEPT:

• Refractive index/Absolute refractive index: The ratio of the speed of light in air/vacuum to the speed of light in the medium is called the refractive index of that medium.

• It is generally denoted by μ or n. It is a dimensionless quantity.

Refractive index = (speed of light in air)/(speed of light in medium)

• The absolute refractive index can never be less than 1.

EXPLANATION:

• The absolute refraction index of the diamond is 2.42. It is the experimental data. So option 3 is correct.

Q12. Answer: (d) Banabhattta

The Correct Answer is Option 4 i.e Banabhatta.

• Fa-Hien:

• He is a Chinese traveler who visited India during the reign of Chandra Gupta II.

• He didn't mention the name of the king in his accounts.

• Fa-Hien provides valuable information on the socio, economic, and religious conditions of the Gupta empire.

• Ramcharitmanas:

• Tulsidas is the author of an epic Ramcharitmanas (a story of Lord Rama)

• It was written in Awadhi language.

• Rajatarangini:

• Rajatarangini is a book written by Kalhana.

• It gives an account of the history of Kashmir.

• It was written in the Sanskrit language.

• Harshacharita:

• Harshacharita is a book written by Banabhatta.

• It was written in the Sanskrit language.

• It gives us accurate information about Harsha and his administration.

Q13. Answer: (c) 342

The pattern followed here is:

$1^3 = 1$

$2^3 = 8$

$3^3 = 27$

$5^3 = 125$

$7^3 = 343$

$11^3 = 1331$

Here, the prime numbers have been cubed in an increasing order.

Hence, '342' is the correct answer.

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Q14. Answer: (b) Radha Mohan Singh

The Correct Answer is Option 2 i.e Radha Mohan Singh.

• Piyush Goyal:

• As of May 2020, he is the current Minister of Railways and Minister of Commerce & Industry in the Government of India.

• He is a Member of the Upper House of the Parliament of India (Rajya Sabha) and the Deputy Leader of Rajya Sabha.

• He received the 4th Annual Carnot Prize in 2018 recognising the pathbreaking transformations in India's energy sector.

• Arun Jaitley:

• He was the former Ministry of Finance, and the Ministry of Corporate Affairs, Government of India (2014-2019).

• He was also the Minister of Defence (2014 & 2017) and the Minister of Information and Broadcasting, Government of India (2014-2016).

• He was posthumously awarded the Padma Vibhushan in 2020 in the field of Public Affairs.

• Radha Mohan Singh:

• As of August 2018, he is the union minister of Agriculture and Farmers Welfare.

• He was currently the chairperson for Parliamentary Standing committee on Railways.

• As of May 2020, Narendra Singh Tomar is the union minister of Agriculture & Farmers Welfare.

• J.P. Nadda:

• As of May 2019, Nadda is the Union Minister of Health and Family Welfare.

• He is the National President of the Bharatiya Janata Party since 20th January 2020.

• As of May 2020, Dr. Harsh Vardhan is the Union Minister of Health and Family Welfare.

Q15. Answer: (c) Pokhran

The Correct Answer is Option 3 i.e Pokhran.

• Pokhran:

• India tested its first nuclear device in Pokhran, Rajasthan in the year 1974.

• 'Smiling Buddha' was the code name of India's first successful nuclear bomb test.

• With the Smiling Buddha, India became the sixth nuclear power in the world after the United States, Soviet Union, Britain, France, and China to successfully test out a nuclear bomb.

• Sriharikota:

• It is located in the Nellore district in Andhra Pradesh.

• Satish Dhawan Space Centre (SDSC) SHAR in Sriharikota is the Spaceport of India.

• It is one of the two satellite launch centers in India

• Kalpakkam:

• It is situated on the Coromandel Coast of Chennai, Tamil Nadu.

• Kalpakkam Nuclear Power Plant in Tamil Nadu first began operating in 1984

• Tarapur:

• It is located in the state of Maharashtra:

• Tarapur Atomic Power Station was the first commercial nuclear power station built in India, commissioned in 1969.

Q16. Answer: (b) C

Let us observe the pattern of 1^(st) and 2^(nd) figure.

Here, the second figure is the mirror image of the first figure when a mirror is placed to the right of the first figure.

Similarly, the fourth figure will be the mirror image of the third figure when a mirror will be placed to the right of the third figure.

Hence, figure 'C' is the correct answer.

Q17. Answer: (c) 2.06

$\sqrt{4.2436}$

Since

$4.0000 < 4.2436 < 4.4100$

So,

$2.00 < \sqrt{4.2436} < 2.10$

So, option 2 and 4 are eliminated.

Now, we can get the correct option by simply squaring it

$(2.06)^2 = 4.2436$

And, $(2.04)^2 = 4.1616$

Hence, option 3 is correct.

Q18. Answer: (c) 15%

Shortcut Trick

Mass of solution = Solute + Solvent = 60 + 340 = 400 g.

Concentration % = (Solute / Solution) × 100.

=> (60 / 400) × 100 = 60 / 4 = 15%.

Therefore The correct answer is 15%.

Alternate Method

Given:

Mass of solute (common salt) = 60 g

Mass of solvent (water) = 340 g

Formula Used:

Mass percentage = [Mass of solute / (Mass of solute + Mass of solvent)] × 100

Calculations:

=> Total mass of solution = 60 g + 340 g = 400 g

=> Mass percentage = (60 / 400) × 100

=> Mass percentage = 60 / 4

=> Mass percentage = 15%

Therefore The correct answer is 15%.

Additional Information

Mass by Volume Percentage

It is defined as the mass of solute in grams present in 100 mL of solution. Formula: (Mass of solute / Volume of solution) × 100.

Solute and Solvent

The component present in smaller amount is the solute, and the component present in larger amount is the solvent.

Saturated Solution

A solution in which no more solute can be dissolved at a particular temperature is called a saturated solution.

Q19. Answer: (a) 3

The correct answer is 3.

Key Points

• Benzene is an aromatic compound with molecular formula C_6H_6.

• It is planar hexagonal in shape with bond angles of 120^o.

• Three double bonds and nine single bonds are present in one molecule of benzene.

Q20. Answer: (a) Kalanithi Maran

The Correct Answer is Option 1 i.e Kalanithi Maran.

• Kalanithi Maran:

• He is the chairman and founder of the Sun Group.

• Sun TV Network was launched by Kalanithi Maran in 1993.

• Sun TV Network is an Indian media company headquartered in Chennai, Tamil Nadu.

• Sun TV Network operates satellite television channels in Tamil, Telugu, Kannada, and Malayalam, airs FM stations across India and owns the SunRisers Hyderabad cricket franchise of IPL

• He started a monthly magazine Poomalai in the year 1990.

• Forbes magazine named him the "Television king of southern India".

• Rakesh Jhunjhunwala:

• He is often referred to as India’s own Warren Buffet.

• He is an Indian investor, trader, and chartered accountant.

• He is the chairman of Hungama Media and Aptech ltd.

• Vikas Oberoi:

• He is Chairman/Managing Director at Oberoi Realty Ltd.

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• Dr. Ranjan Pai:
• He is the Chairman of the Manipal Education and Medical Group (MEMG).
• He received the Padma Bhushan in the year 2011.
• He received the Golden Peacock Lifetime Achievement Award for the Year 2011.

Q21. Answer: (d) statements 1 and 2 together are necessary

1. M is 25 years old today.
Here, there is no reference to S.
Therefore, Statement 1 alone is not sufficient.
2. S is younger to M by 10 years
Here, we need to know the age of M to deduce the age of S.
Therefore, Statement 2 alone is not sufficient.
Combining 1 and 2, we get:
S = M – 10 and M = 25 years.
So, S's age = 25 – 10 = 15 years.
So, both 1 and 2 statements are required to answer the question.
Hence, 'statements 1 and 2 together are necessary' is the correct answer.

Q22. Answer: (b) 18025

The solution is in Hindi. Read it online.

Q23. Answer: (c) The statements are insufficient.

Combining statements 1 and 3, we can arrange in the shortest to tallest order"
T < _ < _ < F
Remaining- K and M
Since there is no given relationship between K and M, we get two cases:
Case 1:
T < K < M < F
Case 2:
T < M < K < F
Thus, there is no way of concluding who is standing in the second place if we arrange shortest to tallest. Hence, the statements are insufficient.
Hence, 'The statements are insufficient' is the correct answer.

Q24. Answer: (b) 45

Let the number of red balls be 15x
Let the number of green balls be 26x
When 12 more green balls are added, the number of green balls become = 26x + 12
The new ratio of red balls to green balls = 1 : 2
15x/(26x + 12) = 1/2
2 × 15x = 1 × (26x + 12)
30x = 26x + 12
30x – 26x = 12
4x = 12
x = 3
Therefore, the number of red balls in the bag = 15x = 15 × 3 = 45
Hence, '45' is the correct answer.

Q25. Answer: (d) Self-pollination

The Correct Answer is Option 4 i.e Self-pollination.
• Self-pollination:
• The transfer of pollen grains from anther to the stigma of the same flower is called self pollination.
• Mendel obtained F2 progeny from F1 generation plants by the method of self pollination.
• Cross pollination:

• The transfer of pollen grains from anther of one flower to the stigma of another flower is called cross pollination.
• Vegetative propagation:
• It is a form of asexual reproduction of a plant where in new plant grows from a fragment of the parent plant.
• Asexual reproduction:
• Asexual reproduction produces plants that are genetically identical to the parent plant.
• In asexual reproduction there is no fusion of male and female gametes takes place.

Q26. Answer: (d) 11.11%

From the graph:
CO2concentration in the year 1995 = 360
CO2concentration in the year 2015 = 400
Hence,
Percentage change = [(400 – 360)/360] × 100
=> 40/360 × 100
=> 1/9 × 100 = 11.11%
Therefore The percentage change in CO2 concentration is 11.11%.

Q27. Answer: (a) more reactive than copper

The Correct Answer is Option 1 i.e more reactive than copper.
• Zinc is more reactive than copper metal and so it can displace copper from copper sulphate solution.
• Zinc displaces the metals present below it in the series.
• Reactivity of an element decreases from top to bottom in the given reactivity series.
• Potassium (K)
• Sodium (Na)
• Calcium (Ca)
• Magnesium (Mg)
• Aluminium (Al)
• Zinc (Zn)
• Chromium (Cr)
• Iron (Fe)
• Lead (Pb)
• Hydrogen (H)
• Copper (Cu)
• Silver (Ag)
• Gold (Au)

Q28. Answer: (d) Jhulan Goswami

The Correct Answer is Option 4 i.e Jhulan Goswami.
• Charlotte Edwards:
• She was an English former professional cricketer who was captain of the England women's team.
• She has won the ICC Women's player of the year 2008.
• She was also named as one of Wisden's five Cricketers of the Year 2014.
• Dane van Niekerk:
• She is a South African cricketer.
• She has been the South Africa's Women's team captain in all three forms since June 2016.
• Meg Lanning:
• She is the current captain of the Australian women's national cricket team.
• She became the first Australian, male or female, to score 2,000 runs in Twenty20 Internationals.
• Jhulan Goswami:
• She is the former captain of India's national women's cricket team.
• She was awarded the ICC Women's Player of the Year award in 2007.
• She became the first bowler to take 200 wickets in WODIs.
• She was also awarded the Padma Shri in the year 2012.

• She was also awarded the Arjuna Award in the year 2010.

Q29. Answer: (c) BrahMos

The Correct Answer is Option 3 i.e BrahMos.

• BrahMos:

• Indian Navy in 2017 successfully test-fired the 290-km strike range Brahmos supersonic cruise missile.

• BrahMos is a medium-range supersonic cruise missile.

• It can be launched from ships, aircraft, or land.

• It is being developed through a collaboration between India and Russia.

• Agni:

• Agni missiles are a series of medium to intercontinental range ballistic missiles developed by India.

• Agni missiles are nuclear weapons capable missiles.

• These are surface to surface ballistic missiles.

• K9 vajra:

• It is a tracked self-propelled howitzer gun.

• It can turn around at zero radii.

• GSAT 17:

• It is an Indian geostationary communications satellite.

• It was launched on June 29, 2017 from Kourou, French Guiana by Ariane-5 VA-238.

• GSAT-17 was launched into a Geosynchronous Transfer Orbit (GTO) by Ariane-5 VA-238 launch vehicle.

Q30. Answer: (d) Kerala

The Correct Answer is Option 4 i.e Kerala.

• The pre-monsoon rains are also known as April rains or summer rains.

• Mango showers are the name of the pre-monsoon showers in Kerala and some parts of Karnataka, these rains help in the early ripening of mangoes.

• They are also known as 'Kaal Baisakhi' in Bengal, as Bardolli Chhera in Assam and as Cherry Blossom showers or Coffee Showers in Kerala.

• Odisha:

• Jharkhand, West Bengal, Andhra Pradesh and Chhattisgarh are the boundaries of Odisha.

• Bhubaneswar is the capital of Odisha.

• Mohan Charan Majhi is the CM of Odisha.

• Uttar Pradesh:

• It shares a boundary with a maximum number of Indian states.

• It shares its border with Uttarakhand, Himachal Pradesh, Haryana, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, Bihar as well as Delhi.

• Yogi Adityanath is the CM of Uttar Pradesh.

• Gujarat:

• Gandhinagar is the capital city of Gujarat.

• It has the longest Coastline in India.

• The city of Anand, located in Gujarat is commonly known as the Milk Capital of India.

• Bhupendra Patel is the current Chief Minister of the state.

Q31. Answer: (d) 8

Shortcut Trick

Put $x = 1$ in first expression: $2(1)^2 + a(1) + 2b = 16 \rightarrow a + 2b = 14$.

Put $x = -1$ in second expression: $(-1)^2 + b(-1) + 2a = -1 \rightarrow 2a - b = -2$.

Multiply second by 2 and add: $(a + 2b) + (4a - 2b) = 14 + (-4) \rightarrow 5a = 10 \rightarrow a = 2$.

Substitute $a = 2$ in first: $2 + 2b = 14 \rightarrow 2b = 12 \rightarrow b = 6$.

Required sum $a + b = 2 + 6 = 8$.

Therefore The correct answer is 8.

Alternate Method

Given:

P(x) = $2x^2 + ax + 2b$, divisor = (x − 1), remainder = 16

Q(x) = $x^2 + bx + 2a$, divisor = (x + 1), remainder = −1

Formula Used:

Remainder Theorem: If a polynomial f(x) is divided by (x − k), then the remainder is f(k).

Calculations:

=> For P(x), remainder = P(1) = 16

=> $2(1)^2 + a(1) + 2b = 16$

=> $2 + a + 2b = 16$

=> $a + 2b = 14$ --- (Eqn 1)

=> For Q(x), remainder = Q(−1) = −1

=> $(-1)^2 + b(-1) + 2a = -1$

=> $1 - b + 2a = -1$

=> $2a - b = -2$ --- (Eqn 2)

=> Multiplying (Eqn 2) by 2: $4a - 2b = -4$

=> Adding (Eqn 1) and modified (Eqn 2): $(a + 2b) + (4a - 2b) = 14 - 4$

=> $5a = 10$

=> $a = 2$

=> Substituting a = 2 in (Eqn 1): $2 + 2b = 14 \Rightarrow 2b = 12 \Rightarrow b = 6$

=> $a + b = 2 + 6 = 8$

Therefore The correct answer is 8.

Additional Information

Remainder Theorem

It states that the remainder of the division of a polynomial f(x) by a linear polynomial (x − a) is equal to f(a).

Factor Theorem

A special case of the remainder theorem where if f(a) = 0, then (x − a) is a factor of the polynomial f(x).

Linear Equations in Two Variables

System of equations like a1x + b1y = c1 can be solved using substitution, elimination, or cross-multiplication methods.

Q32. Answer: (b) 2

Follow BODMAS rule to solve this, as per the order given below,

Step-1-Parts of an equation enclosed in 'Brackets' must be solved first,

Step-2-Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3-Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4-Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

$104 \div [68 - \{29 - (45 - 56 \div 7 \times 4)\}] = ?$

=> $? = 104 \div [68 - \{29 - (45 - 8 \times 4)\}]$

=> $? = 104 \div [68 - \{29 - 13\}]$

=> $? = 104 \div [68 - 16]$

=> $? = 104 \div 52$

=> ? = 2

Q33. Answer: (a) 4

The Correct Answer is Option 1 i.e 4.

• In the modern periodic table, elements having atomic numbers 19 to 36 are placed in the period 4.

• They are K(19), Ca(20), Sc(21), Ti(22), V(23), Cr(24), Mn(25), Fe(26), Co(27), Ni(28), Cu(29), Zn(30), Ga(31), Ge(32), As(33), Se(34), Br(35), Kr(36)

• In the modern periodic table, elements having atomic numbers 55 to 86 are placed in the period 6.

• In the modern periodic table, elements having atomic numbers 37 to 54 are placed in the period 5.

• In the modern periodic table, elements having atomic numbers 11 to 18 are placed in the period 3.

Q34. Answer: (b) -198

Shortcut Trick

If $a + 1/a = k$, then the value of $a^3 + 1/a^3$ is calculated using the shortcut formula: $k^3 - 3k$.

Given: k = −6.

Value = $(-6)^3 - 3 \times (-6) = -216 + 18 = -198$.

Therefore The correct answer is −198.

Alternate Method

Given: $a + 1/a = -6$

Formula used: $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$

=> $(a + 1/a)^3 = (-6)^3$

=> $a^3 + (1/a)^3 + 3 \times a \times (1/a) \times (a + 1/a) = -216$

=> $a^3 + 1/a^3 + 3 \times (-6) = -216$

=> $a^3 + 1/a^3 - 18 = -216$

=> $a^3 + 1/a^3 = -216 + 18$

=> $a^3 + 1/a^3 = -198$

Therefore The correct answer is −198.

Additional Information

Algebraic Cubing Identity

The basic algebraic expansion for sum of cubes is derived from $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$.

Square Relation

If $a + 1/a = k$, then $a^2 + 1/a^2 = k^2 - 2$. This is often used as a prerequisite for higher power questions.

Subtraction Identity

If $a - 1/a = k$, then $a^3 - 1/a^3 = k^3 + 3k$. Note the sign change in the 3k term.

Q35. Answer: (c) A

The option figure that bears the closest resemblance to the question figure is shown below:

The answer figure A is like mirror image of the question. Also, it is the only figure among the answer figures that has three intersecting lines in it, similar to that of question figure.

Hence, ‘figure A’ is the correct answer.

Q36. Answer: (c) 75, 150 and 50

Shortcut Trick

Total Work (LCM of 50, 37.5, 30) = 150 units.

2 × (A + B + C) efficiency = 3 + 4 + 5 = 12 => A + B + C = 6.

Efficiency: A = 6 − 4 = 2; B = 6 − 5 = 1; C = 6 − 3 = 3.

Time: A = 150/2 = 75; B = 150/1 = 150; C = 150/3 = 50.

Therefore The correct answer is 75, 150 and 50 days.

Alternate Method

Given: Time taken by (A+B) = 50 days, (B+C) = 37.5 days (or 75/2 days), and (C+A) = 30 days.

Formula Used: Total Work = Time × Efficiency

Person	Days	Total Work	Efficiency
A + B	50	150	3
B + C	37.5	4	
C + A	30	5	

=> Total efficiency of 2(A + B + C) = 3 + 4 + 5 = 12

=> Efficiency of (A + B + C) = 12 ÷ 2 = 6

=> Efficiency of A = (A + B + C) − (B + C) = 6 − 4 = 2

=> Efficiency of B = (A + B + C) − (C + A) = 6 − 5 = 1

=> Efficiency of C = (A + B + C) − (A + B) = 6 − 3 = 3

=> Time for A = 150 ÷ 2 = 75 days

=> Time for B = 150 ÷ 1 = 150 days

=> Time for C = 150 ÷ 3 = 50 days

Therefore The correct answer is 75, 150 and 50 days.

Additional Information

Combined Work Formula

When pairs are given, the efficiency of individuals is found by (Sum of all pairs ÷ 2) − efficiency of the pair without that individual.

Pipes and Cisterns

The same logic applies to pipes filling a tank, where efficiency represents the rate of flow per unit time.

Q37. Answer: (c) 9 × 10^8J

The correct answer is Option 3, i.e 9 × 108 J

• 1 unit of energy is equal to 1 kilowatt hour (kWh)

• We also know that

• 1 kWh = 3.6 × 10^6 J

• Therefore, 250 units of energy = 250 × 3.6 × 10^6 = 9 × 10^8 J.

Q38. Answer: (b) (7x + 3) (3x – 4) = 0

Shortcut Trick

Convert the given roots directly into linear factors: if root x = a/b, then factor is (bx − a) = 0.

For root x = 4/3 => (3x − 4) = 0.

For root x = −3/7 => (7x + 3) = 0.

The required quadratic equation is the product of these factors: (7x + 3)(3x − 4) = 0.

Therefore The correct answer is (7x + 3)(3x − 4) = 0.

Alternate Method

Given: The roots of the equation are α = 4/3 and β = −3/7.

Formula: A quadratic equation with roots α and β is given by (x − α)(x − β) = 0.

=> (x − 4/3)(x − (−3/7)) = 0

=> (x − 4/3)(x + 3/7) = 0

=> ((3x − 4)/3) × ((7x + 3)/7) = 0

=> (3x − 4)(7x + 3) / 21 = 0

=> (3x − 4)(7x + 3) = 0 × 21

=> (7x + 3)(3x − 4) = 0

Therefore The correct answer is (7x + 3)(3x − 4) = 0.

Additional Information

Standard Form of Quadratic Equation

The equation can also be written as x^2 − (Sum of Roots)x + (Product of Roots) = 0.

Sum and Product Properties

For $ax^2 + bx + c = 0$, Sum (α+β) = −b/a and Product (αβ) = c/a.

Discriminant and Nature of Roots

The value $D = b^2 − 4ac$ determines the nature: D > 0 (Real & Distinct), D = 0 (Real & Equal), D < 0 (Imaginary).

Q39. Answer: (c) Arts

The Correct Answer is Option 3 i.e Arts.

• Usha Uthup:

• She is a famous Indian pop and playback singer, currently a resident of West Bengal.

• She won the Padma Shri Award in the field of Arts in the year 2011.

• She also received the Rajiv Gandhi Purashkar for national integration for quality music.

Q40. Answer: (d) Odisha

The Correct Answer is Option 4 i.e Odisha.

• Pyarimohan Mohapatra:

• He was a former member of Parliament from Odisha.

• He died at a Mumbai hospital in the year 2017.

• Once upon a time, he was considered as the mastermind and the proxy leader of the Biju Janata Dal for more than two decades.

• Naveen Patnaik is the current CM of Odisha.

• Assam:

• Bangladesh, Bhutan, Nagaland, Arunachal Pradesh, Manipur, Mizoram, Tripura, Meghalaya and West Bengal are the

boundaries of the state Assam.
• Dispur is the capital of Assam.
• Himanta Biswa Sarma is the CM of Assam.
• West Bengal:
• Kolkata is the capital of West Bengal.
• Jharkhand, Odisha Bihar, Bangladesh, Assam, Sikkim and Bhutan and Nepal are boundaries of West Bengal.
• Mamata Banerjee is the CM of West Bengal.
• Bihar:
• It is bordered by Nepal, Uttar Pradesh, Jharkhand and West Bengal.
• Patna is the capital of Bihar.
• Nitish Kumar is the present CM of Bihar.

Q41. Answer: (d) Ca and P

The Correct Answer is Option 4 i.e Ca and P.
• The bone cells are known as osteocytes which are embedded in a hard matrix that is composed of Calcium (Ca) and phosphorus (P) compounds.
• Calcium (Ca):
• It provides strength to bones and teeth with vitamins.
• It also plays an important role in blood formation, muscle contraction, clotting of blood, etc.
• Milk, eggs, fish, etc. are the main sources of calcium.
• Phosphorous (P):
• It provides strength to bones and teeth, in coordination with calcium.
• Milk, cheese, green leafy vegetables, etc. are the main sources of Phosphorus.
• Sodium (Na):
• It is normally found in the external fluid of a cell.
• It helps in the functioning of contraction of muscles, in the transmission of nerve impulses in nerve fiber, etc.
• Normal salt, meat, eggs, etc. are the main sources of sodium.
• Fluorine (F):
• It is the most electronegative element.
• Fluorine protects us from dental decay.
• Food, together with drinking water, is the main source of fluorine for human beings.
• Fluorine is essential for the maintenance of solidity of our bones.

Q42. Answer: (a) 11

Symbol	**<**	**×**
Meaning	•	÷

Thus, ([(25 < 15)] × 4) < 1 will be decoded as ([(25 + 15)] ÷ 4) + 1
Solving
([(25 + 15)] ÷ 4) + 1)
= ([(40)] ÷ 4) + 1
= (10) + 1
= 11
Hence, '11' is the correct answer.

Q43. Answer: (d) 26,000

Shortcut Trick
Initial Capital = Rs. 20,000
Increase = 30% of 20,000 = 6,000
New Investment = 130% of Rs. 20,000
New Investment = 1.3 × 20,000 = 26,000
Therefore The correct answer is Rs. 26,000.
Alternate Method

Given:
Last year investment (Principal) = Rs. 20,000
Increase percentage = 30%
Formula:
New Value = Original Value × (1 + Increase%/100)
Calculations:
=> Increase Amount = (30/100) × 20,000
=> Increase Amount = 0.3 × 20,000 = 6,000
=> Total New Investment = 20,000 + 6,000
=> Total New Investment = 26,000
Therefore The correct answer is Rs. 26,000.
Additional Information
Percentage Increase
To increase a number by x%, multiply the number by (1 + x/100).
Percentage Decrease
To decrease a number by x%, multiply the number by (1 − x/100).
Base Value Identification
Always identify the base (100%) on which the percentage change is applied; here, it is last year's investment.

Q44. Answer: (d) 2.5

The Correct Answer is Option 4 i.e 2.5.
• Power:
• The rate of doing work is called power.
• Its SI unit is watt.
• 1 kilowatt (kW) is equal to 1000 Watts.
• 1 megawatt is equal to 1000000 Watts
• 2.5 kilowatt (kW) is equal to 2500 Watts.

Q45. Answer: (b) Nichrome

The Correct Answer is Option 2 i.e Nichrome.
• Aluminium:
• Atomic number is 13.
• It is soft, malleable, and ductile.
• It has high thermal and electrical conductivity
• It has excellent corrosion resistance.
• It is the most abundant metal in the Earth’s crust.
• It is widely used for foil, kitchen utensils, and conductor cables, etc.
• Nichrome:
• It is also known as nickel chrome.
• It is an alloy produced by mixing nickel, chromium.
• It is widely known for its heat resistance.
• It is also well resistant to both corrosion and oxidation.
• It is commonly used in electrical heating devices.
• Copper:
• It is a soft, malleable, and ductile metal.
• It has a very high thermal and electrical conductivity.
• The copper metal turns green in color because of an oxidation reaction.
• Atomic number: 29.
• Iron:
• It is a silvery-white or grayish metal.
• It is ductile and malleable.
• Wrought Iron is the purest form of iron.

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• Iron is the fourth most abundant element in the Earth's crust.
• The atomic number is 26.

Q46. Answer: (b) 800 m

Shortcut Trick

When the angle of elevation changes from 60° to 30° for a constant height (h), the horizontal distance (d) moved is given by: d = h(cot 30° − cot 60°).

d = 692 × (√3 − 1/√3) = 692 × (2/√3) = 692 × (2/1.73).

d = 1384 ÷ 1.73 = 800 m.

Therefore The correct answer is 800 m.

Alternate Method

Given: Height (h) = 692 m, θ1 = 60°, θ2 = 30°.

Formula Used: tan θ = Perpendicular / Base

=> In first position: tan 60° = 692 / x1

=> √3 = 692 / x1 => x1 = 692 / √3

=> In second position: tan 30° = 692 / x2

=> 1/√3 = 692 / x2 => x2 = 692√3

=> Distance (d) = x2 − x1 = 692√3 − 692/√3

=> d = 692 × (√3 − 1/√3) = 692 × (2/√3)

=> d = (692 × 2) / 1.73 = 1384 / 1.73 = 800 m

Therefore The correct answer is 800 m.

Additional Information

Angle of Elevation

The angle formed by the line of sight with the horizontal when looking up at an object.

Trigonometric Ratios for Heights

For standard angles: tan 30° = 1/√3, tan 45° = 1, and tan 60° = √3.

Horizontal Movement Formula

Distance moved = Height × (cot θ_(smaller) − cot θ_(larger)) for an object moving away at a constant altitude.

Q47. Answer: (b) 66

Shortcut Trick

Look at the unit digit of 4356, which is 6. The square root must end in 4 or 6.

Check the range: 602 = 3600 and 702 = 4900.

Since 4356 is between 3600 and 4900, the root is in the 60s. Possibilities are 64 or 66.

Check 652 = 4225. Since 4356 > 4225, the answer must be 66.

Therefore The correct answer is 66.

Alternate Method

Given: Number = 4356

Method: Prime Factorisation

=> 4356 = 2 × 2178

=> 4356 = 2 × 2 × 1089

=> 4356 = 2 × 2 × 3 × 363

=> 4356 = 2 × 2 × 3 × 3 × 121

=> 4356 = 2 × 2 × 3 × 3 × 11 × 11

=> √4356 = √(22 × 32 × 112)

=> √4356 = 2 × 3 × 11 = 66

Therefore The correct answer is 66.

Additional Information

Unit Digit Property

If a perfect square ends in 6, its square root must end in either 4 or 6.

Square of numbers ending in 5

To find (n5)2, multiply n by (n+1) and suffix 25. Example: 652 = (6×7)25 = 4225.

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Perfect Square Identification

A perfect square never ends with the digits 2, 3, 7, or 8.

Q48. Answer: (a) c – (v + s + t)

The required number will lie in the shaded part:

Therefore, Only hardworking but not honest or efficient → c – (v + s + t)

Hence, 'c – (v + s + t)' is the correct answer.

Q49. Answer: (d) Land

Trees are a type of plant. Similarly, desert is a type of land.

Hence, 'Land' is the correct answer.

Q50. Answer: (a) Relief to home buyers by recognising their status as financial creditors

The Correct Answer is Option 1.

• The Insolvency and Bankruptcy Code, 2016 provides a time-bound process to resolve insolvency among companies and individuals.

• Insolvency is a situation where an individual or company is unable to repay their outstanding debt.

• Features of Insolvency and Bankruptcy Code (Amendment) Ordinance, 2018:

• The Ordinance provides significant relief to home buyers by recognizing their status as financial creditors.

• The Ordinance empowers the Government to provide MSMEs with a special dispensation under the Code.

• The Ordinance also provides for a mechanism to allow participation of security holders, deposit holders, and all other classes of financial creditors that exceed a certain number, in meetings of the Committee of Creditors, through the authorized representation.

• The voting threshold for decisions of the committee of creditors has been lowered from 75% to 51%.

Q51. Answer: (a) 2312038

The logic is:

Word	T	I	M	E
Code	20	9	13	5

Similarly,

Word	W	A	T	C	H
Code	23	1	20	3	8

Hence, '2312038' is the correct answer.

Q52. Answer: (c) 2

The correct answer is 2.

• The maximum number of electrons present in the orbit can be calculated by using the following formula: $2n^2$, where n is the principal quantum number.

• The maximum number of electrons that can be accommodated in k shell is 2.

Energy level (principal quantum number)	Shell letter	Capacity of electrons
1	K	2
2	L	8
3	M	18
4	N	32
5	O	50
6	P	72

Q53. Answer: (c) Maharashtra

The Correct Answer is Option 3 i.e Maharashtra.

• Bihar:

• Nitish Kumar is the present CM of Bihar.
• Phagu Chauhan is the present Governor of Bihar.
• Bihar is bordered by Nepal, Uttar Pradesh, Jharkhand, and West Bengal.
• Patna is the capital of Bihar.
• Jharkhand:
• The state is bordered by Bihar, West Bengal, Odisha, Chhattisgarh, and Uttar Pradesh.
• Hemant Soren is the CM of Jharkhand.
• Ranchi is the capital of Jharkhand.
• Gujarat:
• Gandhinagar is the capital city of Gujarat.
• It has the longest Coastline in India.
• The city of Anand, located in Gujarat is commonly known as the Milk Capital of India.
• Acharya Devvrat is the current Governor of the state.
• Bhupendrabhai Patel is the current Chief Minister of the state.
• Kakrapar nuclear power station is located in Gujarat.
• Maharashtra:
• Mumbai is the capital city of Maharashtra.
• The Gateway of India is the most famous monument and Iconic landmark located in Mumbai.
• Eknath Shinde is the current CM of Maharashtra.
• Bhagat Singh Koshyari is the governor of Maharashtra.
• Ministry of External Affairs (MEA) launched the country's first Videsh Bhavan on 27 August 2017.
• Four offices of MEA in Mumbai, namely, (i) Passport Office, (ii) Office of the Protector of Emigrants, (iii) Office of the Regional Director of ICCR, and (iv) Branch Secretariat of MEA, will be integrated and functioning from the newly constructed "Videsh Bhavan".
• The "Videsh Bhavan' is located at the Bandra Kurla Complex (BKC) in Mumbai.
• "Videsh Bhavan" at Mumbai is the first integrated office complex of the Ministry of External Affairs established in any State of India.

Q54. Answer: (d) Planaria

The Correct Answer is Option 4 i.e Planaria.
• Planaria:
• It is a flatworm with very simple 'eyes' that are really just eye-spots that detect light.
• Flatworms are also called planarians.
• They belong to the phylum Platyhelminthes.
• They are characterized by flat bodies, they have no skeleton, no circulatory or respiratory organs, etc.
• Ascaris:
• They belong to phylum Aschelminthes.
• They are bilaterally symmetrical and triploblastic animals
• It is a type of parasitic worm
• Ascariasis is the most common type of roundworm infection in humans.
• Tapeworm:
• They also belong to the phylum Platyhelminthes
• They are triploblastic animals.
• They are characterized by flat bodies, they have no skeleton, no circulatory or respiratory organs, etc.
• Liverfluke:
• They also belong to the phylum Platyhelminthes.
• They are triploblastic animals.
• They are characterized by flat bodies, they have no skeleton, no circulatory or respiratory organs, etc.

Q55. Answer: (a) 543

The pattern followed here is:
343 + 40 = 383
383 + 60 = 443

443 + 40 = 483

483 + 60 = 543

Hence, '543' is the correct answer

Q56. Answer: (c) Both the conclusions follow

The statement says that Leela is considering recommending the movie to her friends.

Therefore, we can conclude that Leela liked the movie and wants her friends to watch it.

Hence, both the conclusions follow.

Q57. Answer: (b) 4151518

The logic is:

Word	G	A	T	E
Code	7	1	20	5

Similarly,

Word	D	O	O	R
Code	4	15	15	18

Hence, '4151518' is the correct answer.

Q58. Answer: (d) Both arguments I and II are strong.

Argument I highlights one of the disadvantages of using smart phones.

It says that one tends to spend more time on smart phones after a point of time and ignore personal time.

On the other hand, argument II states that the additional features offered by smart phones are necessary.

Hence, both the arguments are strong.

Q59. Answer: (c) C2H5OH

The Correct Answer is Option 3 i.e C2H5OH.

• Ethanol:

• It is also known as ethyl alcohol.

• It is a colorless, volatile, and flammable liquid that is soluble in water.

• It is most commonly found in alcoholic beverages.

• It is also used as an antiseptic and as a disinfectant.

• Its molecular formula is C2H5OH.

Q60. Answer: (d) 7

The triangles in the figure are shown below:

ABC, BCD, CDE, EDF,GFH, ACD and CDF

Hence, '7' is the correct answer.

Q61. Answer: (b) [figure]

The Venn diagrams that correctly represents the relationship between:

A) Walking

B) Swimming

C) Exercise

Is shown below:

Both walking and swimming are exercises.

Hence, 'option 2' is the correct answer.

Q62. Answer: (b) 16.5

Shortcut Trick

Assume Total Work = LCM(22, 33) = 66 units.

Efficiency of A = 3 units/hr, B = 2 units/hr.

If pipe A is closed 5.5 hours early, add the work A would have done: 5.5 × 3 = 16.5 units.

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Total adjusted work = 66 + 16.5 = 82.5 units.

Total time = Total adjusted work ÷ Combined efficiency = 82.5 ÷ (3 + 2) = 16.5 hours.

Therefore The correct answer is 16.5 hours.

Alternate Method

Given: Filling time of Pipe A = 22 hours, Pipe B = 33 hours. Pipe A closed 5.5 hours before completion.

Formula Used: Total Work = Efficiency × Time

Person	Days	Total Work	Efficiency
Pipe A	22	66	3
Pipe B	33	2	

Let the total time taken to fill the cistern be T hours.

=> Work done by Pipe A + Work done by Pipe B = Total Work

=> 3 × (T − 5.5) + 2 × T = 66

=> 3T − 16.5 + 2T = 66

=> 5T = 66 + 16.5

=> 5T = 82.5

=> T = 82.5 ÷ 5

=> T = 16.5 hours

Therefore The correct answer is 16.5 hours.

Additional Information

Pipes & Cisterns Logic

Inlet pipes contribute positive work while outlet pipes (leaks) contribute negative work towards filling the tank.

Leaving Early Concept

When a person/pipe leaves 'n' hours before completion, add their potential work (efficiency × n) to the total work and divide by total efficiency.

Work and Wages

Wages are distributed based on the ratio of work done, which is the product of efficiency and the time worked by each pipe/person.

Q63. Answer: (b) A

Given:

Let us observe the pattern of the figure.

We can observe that the half circle is moving 90° anticlockwise on alternate steps while the upper circle does not move at all.

Thus, figure C and D will be eliminated as they did not follow the anticlockwise rotation rule.

Figure B will be eliminated as it does not follow the 90° rule.

Figure ‘A’ fulfills the above condition.

Hence, ‘Figure A’ is the correct answer.

Q64. Answer: (d) Meghalaya

The Correct Answer is Option 4 i.e Meghalaya.

Meghalaya is not the neighbouring state of West Bengal.

State	Boundaries	Chief Minister	Capital
Sikkim	West Bengal, Bhutan, Nepal, China.	Prem Singh Tamang	Gangtok
Odisha	Jharkhand, West Bengal, Andhra Pradesh, Telangana, and Chhattisgarh	Naveen Patnaik	Bhubaneswar
Jharkhand	Bihar, West Bengal, Odisha, Chhattisgarh, and Uttar Pradesh.	Hemant Soren	Ranchi.

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West Bengal	Jharkhand, Bihar, Bangladesh, Odisha, Assam, Sikkim, Bhutan and Nepal.	Mamata Banerjee	Kolkata
Meghalaya	Assam and Bangladesh	Conrad Sangma	Shillong

Q65. Answer: (b) Coordination of muscular movement

The Correct Answer is Option 2 i.e Coordination of muscular movement.

• Cerebrum:

• This is the most developed part of the brain.

• It is the largest part of the brain.

• Functions of the cerebrum include thinking, memory, knowledge, etc.

• Cerebellum:

• Functions of cereb ellum include coordination of muscular body movements and maintenance of posture.

• The cerebellum is known as the little brain.

Q66. Answer: (a) Uttam Singh

The Correct Answer is Option 1 i.e Uttam Singh.

• Lata Mangeshkar Award for Lifetime Achievement is given by the Maharashtra government for the contributions in the field of music.

• The Maharashtra government instituted this award in the year 1992 in the honour of Bharat Ratna Lata Mangeshkar.

• Noted music director and violinist Uttam Singh has won the 2016 Lata Mangeshkar Award for Lifetime Achievement.

• Uttam Singh is a well-known Indian violinist and music director.

• Arijit Singh:

• He is an Indian playback singer.

• He received the 2018 and 2019 IIFA Award for Best Male Playback Singer.

• He also received the Stardust Award for Best Playback Singer Male 2016.

• Bappi Lahiri:

• He is often known as the "Disco King" in India.

• He was an Indian singer, disco musician, and record producer.

• He received the Filmfare Lifetime Achievement Award 2018.

Q67. Answer: (d) 20 kg.m/s

CONCEPT:

• Momentum: The product of mass and velocity of the body is called momentum.

• It is a vector quantity. It is denoted by P.

• Its SI unit is kg ms-1

Momentum (P) = mass (m) x velocity (v)

CALCULATION:

Given that:

Mass (m) = 10 kg

Velocity (v) = 2 ms^(-1)

So momentum (P) = m v = 10 x 2 = 20 kgms^-1.

Q68. Answer: (b) European

The Correct Answer is Option 2 i.e European.

• Arab traders shipped Indian goods to European countries through the Red Sea and the Mediterranean ports.

• Trade was also conducted through overland routes with Afghanistan, Central Asia, and Persia.

• Australia:

• Canberra is the capital of Australia.

• Scott Morrison is the PM of Australia.

• Great Victoria Desert is located in Australia.

• Africa:

• Africa is the world's second-largest continent and second-most-populous continent, after Asia.

• The continent is bounded by the Atlantic Ocean, the Mediterranean Sea, the Red Sea, and the Indian Ocean.
• America:
• The American comprises the continents of North and South America.
• Joe Biden is the current president of America.
• The continent is bounded by the Pacific Ocean, the Atlantic Ocean, the Arctic Ocean, and the Antarctic Ocean.

Q69. Answer: (a) D

All options except 'towel' are used to hold things in place.

Term	Explanation
Clip	flexible or spring-loaded device for holding an object or objects together or in place.
Pin	a thin piece of metal with a sharp point at one end and a round head at the other, used for fastening pieces of cloth, paper, etc
Band	a flat, thin strip or loop of material, used as a fastener or for reinforcement
Towel	a piece of thick absorbent cloth or paper used for drying oneself or wiping things dry.

Hence, 'Towel' is the odd one out.

Q70. Answer: (d) 6.67 ms^(-1)

Shortcut Trick
Average Speed = Total Distance ÷ Total Time
Total Distance = 25 m + 15 m = 40 m
Total Time = 4 s + 2 s = 6 s
Average Speed = 40 ÷ 6 = 6.67 ms^(−1)
Therefore The correct answer is 6.67 ms^(−1).
Alternate Method
Given:
Distance 1 (d1) = 25 m, Time 1 (t1) = 4 s
Distance 2 (d2) = 15 m, Time 2 (t2) = 2 s
Formula Used:
Average Speed = (Total Distance Covered) ÷ (Total Time Taken)
Calculations:
=> Total Distance = d1 + d2 = 25 + 15 = 40 m
=> Total Time = t1 + t2 = 4 + 2 = 6 s
=> Average Speed = 40 / 6
=> Average Speed = 6.666...
=> Average Speed ≈ 6.67 ms^(−1)
Therefore The correct answer is 6.67 ms^(−1).
Additional Information
Average Speed Formula
It is the total path length traveled divided by the total time interval. It is a scalar quantity.
SI Unit of Speed
The standard unit is metres per second (m/s or ms^(−1)). Ensure units are consistent before calculation.
Average Velocity
Unlike speed, average velocity is Total Displacement divided by total time. It includes direction.

Q71. Answer: (d) 9 years

Let Raghav's present age be x.
Raghav's age after 11 years = x + 11
Raghav's age 5 years back = x – 5
Applying the condition,

x + 11 = 5(x – 5)

x + 11 = 5x – 25

5x – x = 25 + 11

4x = 36

x = 9

Thus, Raghav's present age is 9 years.

Hence, '9 years' is the correct answer.

Q72. Answer: (d) C

The mirror image for the following figure when the mirror is kept horizontally is shown below:

Hence, figure 'C' is the correct answer.

Q73. Answer: (a) Dobereiner's law of traids

The Correct Answer is Option 1 i.e Dobereiner's law of traids.

• Dobereiner's law of triads states that when elements are arranged in the order of increasing atomic masses, the atomic mass of the middle element of the triad is approximately the average of the atomic masses of the other two elements.

• For example in the triad of lithium, sodium, and potassium, the atomic mass of lithium is 7 and the atomic mass of potassium is 39.

• The average of masses of lithium and potassium gives the atomic mass of sodium 23.

• Newland's law of octaves:

• It states that when elements are arranged in order to increasing atomic masses, every eighth element has properties similar to the first.

• Mendeleev's law:

• The law states that the physical and chemical properties of the elements are the periodic function of their atomic masses.

• Newton's law:

• Newton's first law states that every object will remain at rest or in uniform motion in a straight line unless an external force acts on it.

• Newton's second law states that the rate of change in the momentum of a body is directly proportional to the applied force on the body.

• Newton's third law states that for every action there is an equal and opposite reaction.

Q74. Answer: (b) 9 : 14 : 10

Shortcut Trick

Simplify ratios by cross-multiplication: a : b = (3×3) : (7×2) = 9 : 14.

Simplify second ratio: b : c = (1×7) : (1×5) = 7 : 5.

Multiply b : c by 2 to make b common: b : c = 14 : 10.

Combine: a : b : c = 9 : 14 : 10.

Therefore The correct answer is 9 : 14 : 10.

Alternate Method

Given:

a : b = 3/2 : 7/3

b : c = 1/5 : 1/7

Calculations:

=> a : b = (3/2) × 6 : (7/3) × 6 (LCM of 2 and 3 is 6)

=> a : b = 9 : 14

=> b : c = (1/5) × 35 : (1/7) × 35 (LCM of 5 and 7 is 35)

=> b : c = 7 : 5

=> To equate b, multiply b : c by 2 => b : c = 14 : 10

=> a : b : c = 9 : 14 : 10

Therefore The correct answer is 9 : 14 : 10.

Additional Information

Compounding Ratios

To combine ratios like a:b and b:c, the common term b must have the same numerical value in both sets. Use the LCM of the two different values of b to scale the ratios.

Fractional Ratios

A ratio of fractions (x/y : p/q) can always be simplified to an integer ratio by multiplying both sides by the LCM of the denominators (y and q), or simply by cross-multiplication (xq : py).

Proportion Rule

If a/b = c/d, then they are in proportion. The product of means equals the product of extremes (b×c = a×d).

Q75. Answer: (d) C

The triangle shaped figure flips 90° anticlockwise in each step and also moves clockwise to the next block in each step.

Therefore, Figure A, B and D are eliminated

Hence, figure C is the correct answer.

Q76. Answer: (a) Is a member of Rajya sabha

The Correct Answer is Option 1 i.e Is a member of Rajya sabha.

• Non-confidence motion:

• It has been mentioned under Rule 198 of the Rules of Procedure and conduct of Lok Sabha.

• The motion of No-confidence can be moved only in Lok Sabha.

• Rajya Sabha does not have the power to move such motion.

• It is moved against the entire Council of Ministers and not on individual ministers or private members.

• The motion has to be passed by a simple majority.

• When a no-confidence motion has been passed in the house then the Union council of ministers needs to resign and the union government collapses.

• The Prime Minister of India cannot participate in voting on a non-confidence motion against her/his government if she/he is a member of Rajya Sabha.

Q77. Answer: (d) NITI Aayog

The Correct Answer is Option 4 i.e NITI Aayog.

• Niti Aayog:

• It is a policy think tank of the Government of India.

• It is neither a constitutional body nor a statutory body

• The Chairperson is the Prime Minister of India.

• Amitabh Kant is the present CEO of Niti Aayog.

• NITI Aayog has launched Move Hack, a global mobility hackathon to crowdsource solutions aimed at the future of mobility in India.

• MoveHack aims to bring about innovative, dynamic, and scalable solutions to problems pertaining to mobility.

• Startup India:

• It is an initiative taken by the government of India to promote and encourage the entrepreneurial spirit amongst its citizens.

• It was launched on 16th January 2016.

• Standup India:

• The Standup India scheme was launched on 5th April 2016:

• It was launched to promote entrepreneurship among Scheduled Caste/Schedule Tribe and Women for loans in the range of Rs 10 Lakhs to Rs 100 Lakhs.

• Startup Village Entrepreneurship Programme:

• The scheme was launched in the year 2018.

• It is a sub-scheme of Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY-NRLM).

• It has been launched to stimulate economic growth and reduce poverty and unemployment in villages by creating self-sustainable self-employment opportunities for youths located in selected villages.

Q78. Answer: (b) East-West

Z and L travel in opposite directions (East-West)

To meet again, they must travel the opposite of their original directions.

Thus, the person who is traveling east must travel west. And the person who was traveling west must travel east.

So, both the person are meet at the middle point facing East and West.

Hence, ‘East-West’ is the correct answer.

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Q79. Answer: (a) Shahid Kapoor

The Correct Answer is Option 1 i.e Shahid Kapoor.

• The 18th edition of the International Indian Film Academy Awards was held in New York in 2017.
• Shahid Kapoor:
• He is an Indian bollywood actor.
• He been awarded with Best Actor (Male) award for Udta Punjab at the 18th IIFA Awards held in 2017.
• He also received the 2015 Filmfare Award for Best Actor for the film Haider.
• Arjun Kapoor:
• He is an Indian bollywood actor.
• He received the Zee Cine Award Best Male Debut for the year 2013.
• He received the Superstar of Tomorrow (Male) of Stardust Award for Ishaqzaad In the year 2013.
• Aamir Khan:
• He received the Deenanath Mangeshkar Award 2017 for Dangal movie.
• He received Padma Shri in the year 2003.
• He also received Padma Bhushan in the year 2010.
• He received the 2002 IIFA Award for Best Actor for the film Lagaan.
• Salman Khan;
• He received the IIFA Habitat Humanity Ambassadorship Award in the year 2010.
• He also won the Airtel Superstar Hero Award 2011 for the film Bodygaurd.

Q80. Answer: (d) 12

Follow BODMAS rule to solve this, as per the order given below,

Step-1- Parts of an equation enclosed in 'Brackets' must be solved first,

Step-2- Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3- Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4- Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

$\{(99 – 1)/7^2\} \times 2 + 8 = ?$

$\Rightarrow ? = \{98/49\} \times 2 + 8$

$\Rightarrow ? = 2 \times 2 + 8$

$\Rightarrow ? = 4 + 8 = 12$

Q81. Answer: (d) Azim Premji

The Correct Answer is Option 4 i.e

• Azim Premji:
• Azim Premji has been honoured with the 2017 Carnegie Medal of Philanthropy for his efforts to reform India’s public school system.
• He is the chairman of Wipro Limited.
• He is an Indian engineer, investor and philanthropist.
• He is informally known as the Czar of the Indian IT Industry.
• He was awarded with Padma Vibhushan in the year 2011.
• Ness Wadia:
• He is an Indian businessman.
• He is the co-owner of the Indian Premier League cricket team Kings XI Punjab.
• Ratan Tata:
• He is an Indian businessman, philanthropist, and a former chairman of Tata Sons.
• He received the Padma Vibhushan in the year 2008.
• He also received the Padma Bhushan in the year 2000.
• Anil Ambani:
• Anil Ambani is the Chairman of Reliance Group.
• He was conferred with the ‘Entrepreneur of the Decade Award’ by the Bombay Management Association, 2002.

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Q82. Answer: (d) Aluminium

The Correct Answer is Option 4 i.e Aluminium.

• Sound waves are longitudinal waves.

• The speed of sound is different in different mediums.

• The speed of sound is maximum in solids and minimum in gases.

• In a medium, the speed of sound basically depends upon the elasticity and density of the medium.

• The speed of sound is independent of frequency.

• The speed of sound is independent of pressure.

• The speed of sound increases with the increase of temperature of the medium.

• When sound enters from one medium to another medium, its speed and wavelength changes but the frequency remains unchanged.

Medium	Speed of sound (m/s)
Normal Air	343
Water	1433
Steel (stainless)	5970
Iron	5130
Nickel	6040
Aluminium	6420

Q83. Answer: (a) Nephew

The family tree diagram is shown below:

Given: Pointing to a photograph, Neel says he is the son of the only daughter of the father of my sister.

1. Father of Neel's sister is the father of Neel.

2. Son of the only daughter implies that the person in the photograph is the son of Neel's sister.

Hence, Neel is pointing at his 'Nephew'.

Hence, 'Nephew' is the correct answer.

Q84. Answer: (d) Only assumption I is implicit

The statement does not talk or suggest anything about the newspaper in general.

Therefore, assumption II is not implicit.

The meaning of the title is that our sufferings are a product of our thoughts.

Thus, it can be safely assumed that our actions depend on our thoughts.

Hence, only assumption I is implicit.

Q85. Answer: (a) Area

CONCEPT:

• Thrust: The force acting perpendicular to the surface of the object is called thrust.

• It is a type of force so the SI unit of thrust is Newton (N).

• The effect of thrust is more on the smaller surface area than the thrust acting on a larger surface area.

EXPLANATION:

• The effect of thrust depends on the area of the surface on which it acts. So option 1 is correct.

• The normal force exerted by liquid at rest on a given surface in contact with it is called the thrust of liquid on that surface.

• The normal force (or thrust) exerted by liquid at rest per unit area of the surface in contact with it, is called pressure of liquid or hydrostatic pressure.

Q86. Answer: (d) 10

Shortcut Trick

For any two consecutive natural numbers n and (n+1), the number of non-perfect square numbers between their squares is always 2n.

Here, n = 5 and n + 1 = 6.

Number of non-perfect square numbers = 2 × 5 = 10.

Therefore The correct answer is 10.

Alternate Method

Given: Two consecutive squares 5^2 and 6^2.

Formula Used: Count = (Higher Square − Lower Square) − 1

=> Lower perfect square = $5^2 = 25$

=> Higher perfect square = $6^2 = 36$

=> Numbers between them = 26, 27, 28, 29, 30, 31, 32, 33, 34, 35

=> Total count = 36 − 25 − 1

=> Total count = 11 − 1 = 10

Therefore The correct answer is 10.

Additional Information

Property of Consecutive Squares

Between n^2 and $(n+1)^2$, there are 2n non-perfect square numbers. This is because $(n+1)^2 - n^2 = n^2 + 2n + 1 - n^2 = 2n + 1$. Excluding the endpoint gives $(2n+1) - 1 = 2n$.

Perfect Square Definition

A perfect square is a number that can be expressed as the product of an integer with itself (e.g., 1, 4, 9, 16, 25...).

Sum of Odd Numbers

The square of a number n is equal to the sum of the first n odd natural numbers. For example, $5^2 = 1 + 3 + 5 + 7 + 9 = 25$.

Q87. Answer: (c) 200

Shortcut Trick

Pass Marks = Marks Obtained + Failing Marks

Pass Marks = 40 + 40 = 80 marks

As per question, 40% of Maximum Marks = 80

100% of Maximum Marks = (80 ÷ 40) × 100 = 200

Therefore The correct answer is 200 marks.

Alternate Method

Given:

Passing Percentage = 40%

Marks Obtained = 40

Failing Margin = 40

Formula Used:

Maximum Marks = (Passing Marks ÷ Passing Percentage) × 100

Calculations:

=> Passing Marks = 40 + 40 = 80

=> Let Maximum Marks be x

=> 40% of x = 80

=> (40 ÷ 100) × x = 80

=> x = (80 × 100) ÷ 40

=> x = 2 × 100

=> x = 200

Therefore The correct answer is 200 marks.

Additional Information

Percentage Change

Percentage change = (New Value − Old Value) ÷ Old Value × 100. Always use the original value as the base.

Pass/Fail Case Logic

If two candidates are given, use the difference in their percentage to find the difference in their marks: (Diff in %) × Total = Diff in Marks.

Base Change Rule

If A is x% more than B, then B is [x ÷ (100 + x)] × 100% less than A.

Q88. Answer: (a) 5 hours 6 minutes

Shortcut Trick

Total Capacity (LCM of 6.8 and 10.2) = 20.4 units.

Efficiency: A = 20.4 ÷ 6.8 = 3 units/hr; B = 20.4 ÷ 10.2 = 2 units/hr.

Work by B in 1.7 hours = 2 × 1.7 = 3.4 units.

Remaining work = 20.4 − 3.4 = 17 units; Time for both = 17 ÷ (3 + 2) = 3.4 hours.

Total time = 1.7 + 3.4 = 5.1 hours = 5 hours 6 minutes.

Therefore The correct answer is 5 hr 6 min.

Alternate Method

Given: Filling time of Pipe A = 6.8 hours, Pipe B = 10.2 hours. Pipe B runs alone for 1.7 hours.

Formula Used: Total Work = Efficiency × Time; Total Time = Initial Time + Remaining Time.

Person	Days/Hours	Total Work	Efficiency
Pipe A	6.8	20.4	3
Pipe B	10.2	2	

=> Work done by Pipe B in 1.7 hours = 2 × 1.7 = 3.4 units

=> Remaining work to be filled by (A + B) = 20.4 − 3.4 = 17 units

=> Efficiency of (A + B) = 3 + 2 = 5 units/hr

=> Time taken by (A + B) = 17 ÷ 5 = 3.4 hours

=> Total time taken = 1.7 + 3.4 = 5.1 hours

=> Conversion: 0.1 hours = 0.1 × 60 = 6 minutes

=> Total time = 5 hours 6 minutes

Therefore The correct answer is 5 hr 6 min.

Additional Information

Pipes and Cisterns Efficiency

Efficiency is inversely proportional to the time taken. If a pipe fills a tank in x hours, its 1-hour work is 1/x.

Inlet and Outlet Pipes

Inlet pipes have positive efficiency (+), while outlet pipes (leaks) have negative efficiency (−).

Decimal to Time Conversion

To convert decimal hours to minutes, multiply the decimal part by 60 (e.g., 0.1 hr × 60 = 6 min).

Q89. Answer: (c) Cousin

The family tree diagram is shown below:

1. Vinita and Nikita are sisters.

2.Vinay is the son of Nikita's father's sister.

The final arrangement will be:

Hence, Vinay is a 'cousin' of Nikita.

Hence, 'cousin' is the correct answer.

Q90. Answer: (a) 80 km/h

Shortcut Trick

Total distance = Length of train + Length of bridge = 153 + 747 = 900 m

Speed (m/s) = 900 ÷ 40.5 = 200 ÷ 9 m/s

Speed (km/h) = (200 ÷ 9) × (18 ÷ 5) = 40 × 2 = 80 km/h

Therefore The correct answer is 80 km/h.

Alternate Method

Given:

Length of train (L1) = 153 m

Length of bridge (L2) = 747 m

Time taken (T) = 40.5 seconds

Formula Used:

Speed = Total Distance ÷ Total Time

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To convert m/s to km/h, multiply by 18/5.

Calculations:

=> Total Distance = 153 + 747 = 900 m

=> Speed in m/s = 900 ÷ 40.5

=> Speed in m/s = 9000 ÷ 405 = 200 ÷ 9 m/s

=> Speed in km/h = (200 ÷ 9) × (18 ÷ 5)

=> Speed in km/h = 40 × 2 = 80 km/h

Therefore The correct answer is 80 km/h.

Additional Information

Unit Conversion

To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Train Crossing Objects

When a train crosses a stationary object of length L (like a bridge or platform), distance = Train Length + L. If it crosses a point object (pole/man), distance = Train Length.

Relative Speed

For two trains moving in the opposite direction, relative speed = S1 + S2. In the same direction, relative speed = |S1 − S2|.

Q91. Answer: (a) 578843

The logic is:

Word	J	A	I	L
Code (Only unit digit is considered)	10 – 1 = 9	1 – 1 = 0	9 – 1 = 8	12 – 1 = (1)1

Similarly,

Word	P	R	I	S	O	N
Code (Only unit digit is considered)	16 – 1 = (1)5	18 – 1 = (1)7	9 – 1 = 8	19 – 1 = (1)8	15 – 1 = (1)4	14 – 1 = (1)3

Hence, ‘578843’ is the correct answer.

Q92. Answer: (c) B

Let us observe the pattern of figures A and C.

The smaller end of the figure will always be in touch with the folded line as is in the original figure. This condition is not followed by figures A and C. Thus, they will be eliminated.

Let us observe the pattern of figure D.

Only one end of the figure will always remain in touch with the folded line as is in the original figure. Thus, figure D will be eliminated.

Hence, ‘figure B’ is the correct answer

Q93. Answer: (b) 82°

Shortcut Trick

Apply the Alternate Segment Theorem directly.

The angle between a tangent (CD) and a chord (BC) through the point of contact (C) is equal to the angle subtended by the chord in the alternate segment (angle BAC).

=> angle BAC = angle BCD

=> angle BAC = 82°

Therefore The correct answer is 82°.

Alternate Method

Given:

angle BCD = 82°, where CD is a tangent to the circle at point C and BC is a chord.

Formula Used:

Alternate Segment Theorem: The angle between a tangent and a chord through the point of contact is equal to the angle in the alternate segment.

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Calculations:

=> In the given figure, CD is the tangent at point C.

=> BC is a chord passing through the point of contact C.

=> The angle between the tangent CD and the chord BC is angle BCD = 82°.

=> According to the Alternate Segment Theorem, this angle is equal to the angle subtended by the chord BC in the alternate segment.

=> The angle in the alternate segment is angle BAC.

=> Therefore angle BAC = angle BCD

<

Q94. Answer: (a) 62.5 ms^(-1)

CONCEPT:

• Equation of motion: The mathematical equations used to find the final velocity, displacements, time, etc of a moving object without considering force acting on it are called equations of motion.

• These equations are only valid when the acceleration of the body is constant and they move on a straight line.

There are three equations of motion:

V = u + at

V2 = u2 + 2 a S

$S = ut + 1/2at^2$

Where, V = final velocity, u = initial velocity, s = distance traveled by the body under motion, a = acceleration of body under motion, and t = time taken by the body under motion.

EXPLANATION:

Here acceleration is acceleration due to gravity (a = g = 10 m/s2).

Time of ascent (t) = Time of descent (t)= 12.5/2 = 6.25 s

Final velocity (v) = 0 (at maximum height), Initial velocity (u) = ?

Using v = u + at,

we get

=> 0 = u + (-10 x 6.25)

=> -u = - 10 x 6.25

=> u = 62.5 ms^(-1)

• The Velocity with which it was thrown up is 62.5 ms-1. So option 1 is correct.

Q95. Answer: (b) 8800

$(0.16 \times 1.65)/(0.075 \times 0.02^2) = ?$

=> $? = (0.16 \times 1.65)/(0.075 \times 0.0004)$

=> ? = 0.264/(0.00003)

=> ? = 8800

Q96. Answer: (b) Cellulose and pectin

The Correct Answer is Option 2 i.e Cellulose and pectin.

• Chitin:

• Chitin is a large, structural polysaccharide, and is a derivative of glucose.

• It is a hard substance found in exoskeletons of arthropods and also in cell walls of certain fungi and algae.

• Plant cell wall:

• The plant cell wall is made up of cellulose and pectin.

• It provides a structural framework to support the growth of plants.

• The cell wall also acts as the first line of defense against pathogens.

• Pectin:

• It is a polysaccharide material that is found in fiber within the cell walls of most plants.

• It also contributes to the cell structure of plants.

• Murein:

• It is a polymer that makes up the cell wall of most bacteria.

• It is made of chains of alternating molecules called N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM).

Q97. Answer: (b) Neither I nor II follows

The information in the statement is insufficient to determine the profession of Ranjan.

Therefore, conclusion I does not follow.

The statement does not give any information about the likes or dislikes of Lata.

Therefore, conclusion II does not follow.

Hence, “neither I nor II follows” is the correct answer.

Q98. Answer: (b) 2 kg m/s

CONCEPT:

• Momentum: momentum is the product of the mass and velocity of an object. It is a vector quantity, possessing a magnitude and a direction.

• The unit of momentum (P) is kg m/s.

• Dimension: [MLT^(-1)]

=> Momentum (P) = M V

Where M = mass, V = velocity.

• Kinetic energy: It is the energy of the body associates with its motion.

• The unit of kinetic energy (K) is kg m s^(-2).

• Dimension: [ML²T^(-2)]

=> K = ½ m v2

where K is kinetic energy, m is mass; v is the velocity of the body.

CALCULATION:

Given Mass (M) = 200gm = 0.2 kg.

=> Kinetic energy = 10 J

=> (1/2)MV² = 10 J

=> (1/2) x 0.2 x V²= 10

=> V² = (10x2)/0.2

=> V² = 100

=> V = 10 ms^(-1)

Momentum = M V

= 0.2 x 10

Momentum = 2 kg m/s.

The Correct Answer is Option 2 i.e 2 kg m/s.

Q99. Answer: (d) 50,000

Shortcut Trick

Total distance = Circumference × Number of rotations (n)

99 × 10^5 cm = (π × d) × n

n = (99 × 1000 × 100) ÷ (22/7 × 63)

n = 9,900,000 ÷ 198 = 50,000

Therefore The correct answer is 50,000 rotations.

Alternate Method

Given:

Diameter (d) of the wheel = 63 cm

Total Distance = 99 km

Formula used:

Circumference of a circle = πd

Number of rotations (n) = Total Distance ÷ Circumference

=> Distance in cm = 99 × 1000 × 100 = 9,900,000 cm

=> Circumference = (22/7) × 63 cm

=> Circumference = 22 × 9 = 198 cm

=> n = 9,900,000 ÷ 198

=> n = 50,000

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Therefore The correct answer is 50,000 rotations.

Additional Information

Distance and Rotations

Distance covered by a rolling wheel in one complete revolution is exactly equal to its circumference (2πr or πd).

Unit Conversions

Always ensure units are consistent: 1 km = 1,000 meters = 100,000 cm.

Circle Properties

Radius (r) = Diameter (d) ÷ 2. Area of circle = πr².

Q100. Answer: (a) 18 km

Shortcut Trick

In this type of problem, the total distance covered by both X and Y together is equal to twice the distance between P and Q.

Total distance = 2 × 21 = 42 km.

The distance covered is proportional to their speeds because time is constant until they meet.

Distance PR = [Speed of X ÷ (Speed of X + Speed of Y)] × Total Distance

Distance PR = [3 ÷ (3 + 4)] × 42 = (3 × 42) ÷ 7 = 18 km.

Therefore The correct answer is 18 km.

Alternate Method

Given: Distance PQ = 21 km, Speed of X = 3 kmph, Speed of Y = 4 kmph.

Formula Used: Distance = Speed × Time

=> Let the time when they meet at R be t hours.

=> Distance covered by X (PR) = 3 × t

=> Distance covered by Y (PQ + QR) = 4 × t

=> We know that (PQ + QR) + PR = 2 × PQ

=> (4 × t) + (3 × t) = 2 × 21

=> 7t = 42

=> t = 6 hours

=> Distance PR = Speed of X × t = 3 × 6 = 18 km.

Therefore The correct answer is 18 km.

Additional Information

Relative Speed

When two bodies move towards each other, their relative speed is the sum of their individual speeds (S1 + S2).

Constant Time Property

If two objects start at the same time and meet, the ratio of distances covered is equal to the ratio of their speeds (D1/D2 = S1/S2).

Meeting Point Logic

In scenarios where one person reaches the end and returns, the sum of distances covered by both equals 2 × Total Distance.

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